SKYWAYS

Frontier Guardian: The 36th Fighter-Bomber Wing ... page 10

Rip Tide in the Sky

page 16

Skyblazers of 22nd Fighter-Bomber Sqd. over Germany

25¢

PLANE FAX

Quick picture of

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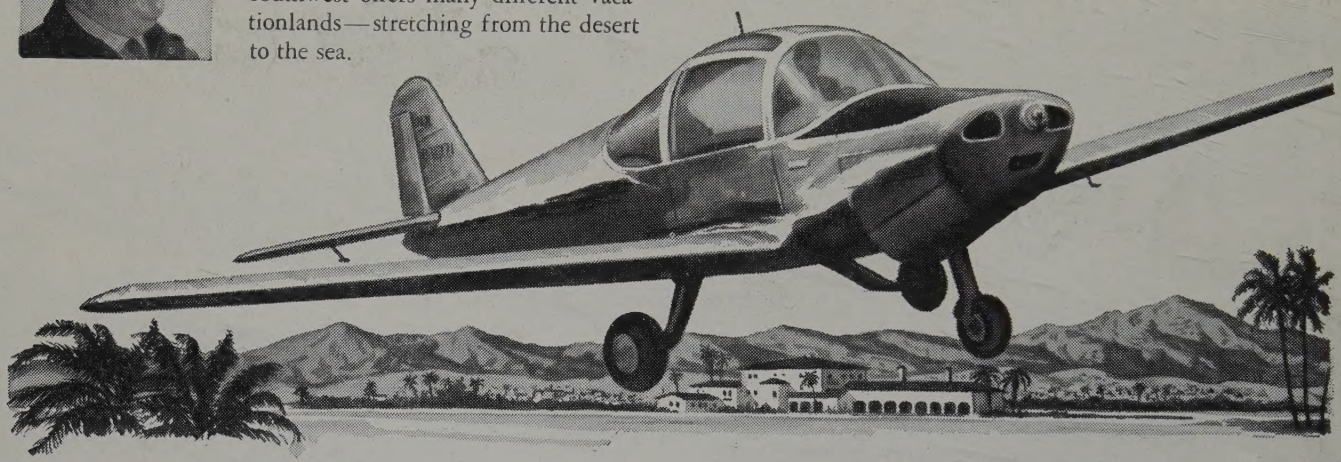

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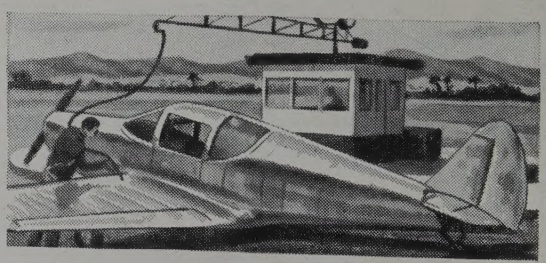

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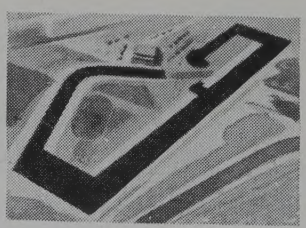

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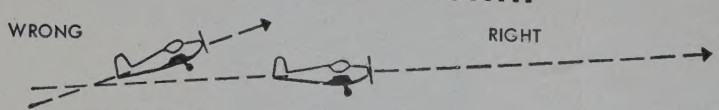

W. H. Coffin says: "The safety rule we stress is that on take-off, flying speed is more important than altitude. Sudden pull-ups and steep take-off climbs are invitations to a full power stall."

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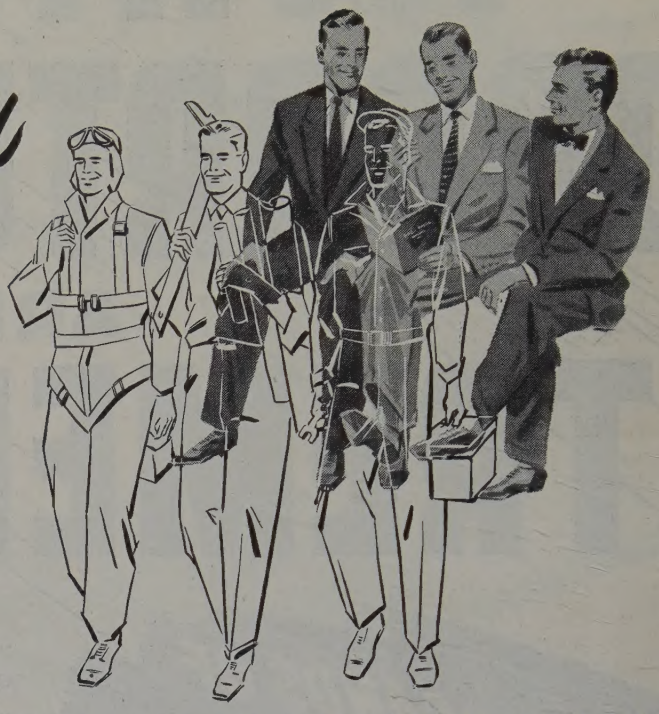

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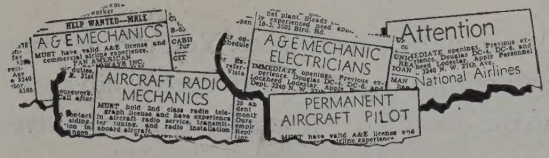

We can offer you *definite proof* of the above statement... or, to prove it to yourself, watch the "Help Wanted" columns of any of the big city newspapers. Aside from the fact that there *are* many many jobs open in aviation today, the future requirements of this tremendous, rapidly-growing industry will assuredly grow far in excess of the number of men available and qualified to fill the jobs.

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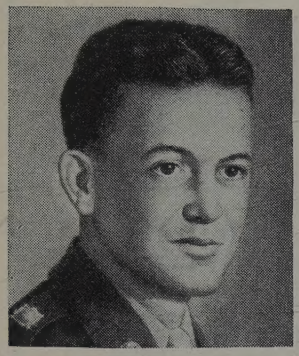
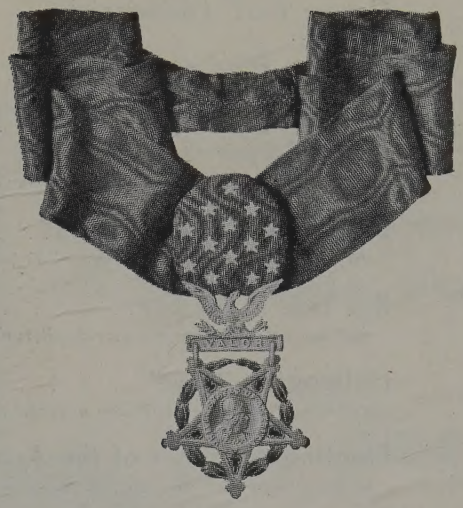
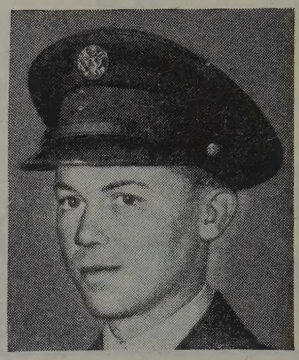
Medal of Honor

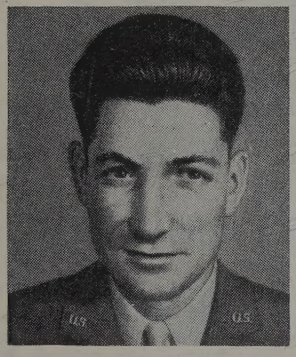


Sergeant Travis Watkins, Gladewater, Tex.—Medal of Honor





Private First Class Melvin Brown, Mahaffey, Pa.—Medal of Honor



Lieutenant Frederick Henry, Clinton, Okla.—Medal of Honor

Major General William F. Dean, Berkeley, Calif.—Medal of Honor

Sergeant Charles Turner, Boston, Mass.—Medal of Honor

This is the season when you think of stars. The one over Bethlehem. The ones on Christmas trees.

But this year remember another star, too—the one on the Medal of Honor. And make a place in your heart for the brave, good men who've won it. Men who, oftener than not, made the final, greatest sacrifice—so that the stars on your Christmas tree, and the stars in your country's flag, might forever shine undimmed.

Right now—today—is the time to do something important for these men who died for you. You can, by helping to defend the country they defended so far "above and beyond the call of duty."

One of the best ways you can make defense *your* job, too, is to buy more . . . and more . . . and more United States Defense Bonds. For your bonds help strengthen America. And if you make this nation strong enough you'll create, and keep, the peace for which men died.

Buy Defense Bonds through the Payroll Savings Plan where you work or the Bond-A-Month Plan where you bank. Start today!

Peace is for the strong...Buy U. S. Defense Bonds

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SKYWAYS

Cover: F-84 Thunderjets — *January, 1952*

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1-52

AIR YOUR VIEWS

Taylorcraft Report

Gentlemen:

This is a good time to give you a brief run-through on the situation here at Taylorcraft. As you know, this company has been practically dormant for about three years and was kept alive with the personal funds of a few people who had faith in aerial transportation in owner-operated vehicles and particularly in Taylorcraft. The Taylorcraft Board of Directors is composed 100 per cent of airplane pilots. This is true also of all company officials and the majority of department heads.

The company is in sound financial condition. The recent stock issue has been entirely sold, all company buildings, property and inventory are free of mortgages or encumbrances of any kind. All of the old debts have been settled. A large inventory of parts, materials and some partially constructed assemblies were carried over from the old company, as were jigs, tools, dies and a lot of machinery.

Type certificates on three different models of airplanes have all been paid for as well as the accompanying engineering data.

The plant itself was built for Taylorcraft, is adequate in size, yet compact and efficiently laid out so as to keep expenses and overhead well under control.

Variations of three basic models give Taylorcraft broader coverage of the market than that of any other airplane manufacturer. The *Sportsman* heads the side-by-side series. Powered by 85-hp Continental engine, it compares in beauty, performance, speed and comfort with high-priced airplanes. The new *Sportsman* was ATC'd on June 30, 1951, as Model 19, and has a gross load of 1500 pounds. It lists at $3895.00 at Conway. The *Tourist* is a four-place airplane designed for comfort, eye appeal and easy flying for non-professional pilots. It was ATC'd on April 3, 1951. The *Tandem* agricultural plane for spraying, dusting, seeding, fertilizing, defoliating; for banner towing, for flight training, has flown with outstanding performance. It will be ATC'd when conditions warrant.

The company is active in war production. Additional contracts are being negotiated with several of the largest producers of Air Force planes. The company is awake to any possible new developments to make its airplanes more useful, to increase their performance or to lower production costs. We have a sensible research policy now to examine every idea that turns up, but not to go overboard in research costs. At this time we are cooperating with Diesel Power Incorporated in the development of a light diesel engine. It is now flying experimentally.

So you see, we have all the basic ingredients of a successful business—men, money, materials and markets. We are doing some war work, but we will make the manufacture of personal airplanes and the development of the market, backing up our dealers, our number one job.

ALFRED B. BENNETT

Taylorcraft, Inc.
Conway, Pennsylvania

That states the case for Taylorcraft very neatly, Mr. Bennett. Having flown a couple of the new Taylorcrafts, we share your enthusiasm for the planes and the company that builds them. Here's wishing you all the best.—ED.

Stall Trouble

Gentlemen:

No! No! A thousand times no! In the article, *"Flight-Test Changes,"* the author states that if the throttle is closed during minimum-speed maneuvering, the plane will stall if being flown as slowly as possible. This is not a true statement. Unless a slight amount of back-pressure is applied, the airplane will never stall. It will drop its nose and retain normal gliding speed. I repeat, it will not stall unless back pressure is applied. Try it yourself, but remember . . . don't move that stick! Yes, I know that CAA says it will. But give the CAA a little time and it will correct this misconception.

MYRON COLLIER
Flight Instructor

Butler, Ohio

Apparently the CAA considers the airplane's dropping its nose to pick up flying speed a condition of stall. In this case, the so-called "stall" is the result of a too-flat glide, the throttle chopped. A well-designed airplane should not completely stall, but perhaps the catch in this theory is the word "completely."—ED.

Twin Mustang

Gentlemen:

Is the F-82 *Twin Mustang* a night-fighter carrying a pilot and a radar operator, or just a ground-support escort fiighter?

LUIS A. DIAZ G.

Rancagua, Chile

There have been several versions of the F-82, among them a night-fighter carrying pilot and radar operator. However, at the present time, we believe the F-82 is being used mainly a a ground-support plane.—ED.

Tornado

Gentlemen:

I believe there was a typographical error in a caption. The *Tornado* is the B-45, not the B-47.

V. ALIKSANDRAIRCIUS

Brooklyn, N. Y.

Right you are, sir. It was a typo error.—ED.

Research Rocket

Gentlemen:

In the November issue, my eye caught the small hole in the nose of the *Viking* rocket on page 15. Could you tell me for what purpose that is?

P. WECK

Albert Lea, Minn.

We asked the Glenn L. Martin Company about that and this was the reply, "The hole in the head of the Viking *is connected with an instrument on the inside which indicates the ram pressure as the rocket speeds through the air. This indicates air pressure and temperature, but does not necessarily indicate speed. Speed readings could be obtained from the ram-pressure readings, however, if a number of other factors are known and calculated. In an airplane, the reverse is true, the ram pressure giving an indication of the speed."*—ED.

Which is it?

Gentlemen:

I am enclosing a picture that has me mystified. A newspaper called it a P-80. I say it's a T-33.

B. WALKER

Verdun, Quebec

You are right. The plane is a T-33, two-place trainer version of the P-80 (now F-80).—ED.

DOUGLAS AD-5 has been announced by the Navy, as the first "multiplex" plane to be built

MILITARY AVIATION

Turboprop Plane for AF

Production of a limited number of new twin-engine turboprop airplanes for the USAF was announced recently. Patterned after the Convair 44-passenger commercial transport and the T-29 navigator trainer, the new turboprop planes will be used by the Air Force for service test purposes. Initially, the planes will be powered by 3,000-hp Allison T-38 gas turbine engines. Structural provisions, however, will be made for easy installation of more advanced Allison turboprop engines when they become available. Several of the new turboprop planes will contain bombardier training equipment. Others will have the latest electronic equipment for navigation instruction, while some will contain no special equipment at all. First delivery by Consolidated Vultee is expected to be accomplished soon.

Sapphire for B-57A

The Martin-built B-57A *Canberra* will be powered by the American-built *Sapphire* turbojet engine, it was announced recently. The *Sapphire* has a rated thrust of 7200 pounds, and is being built by the Wright Aeronautical Company under license from Armstrong Siddeley Motors, Ltd., of Coventry, England. The Wright-built *Sapphires* will be designated J-65-W-1, and will have the same internal design as that of the original design. However, arrangement of accessories will be considerably different to conform with U.S. standards.

Voodoo Ordered

According to a Washington report, the McDonnell XF-88 *Voodoo* twin-jet fighter is being ordered into major production by the USAF. One of the longest-range jet fighters, the *Voodoo* will see duty as a bomber escort fighter. The XF-88 is powered by two Westinghouse J-34-WE-22 engines, each rated at 3600 pounds thrust with afterburner. Wings and tail surfaces of the *Voodoo* are swept back 35°. Estimates give the '88 a top speed in the "over-700-mph class." Pilot's compartment is pressurized and bullet-proof, and armament includes six 20-mm cannon, plus under-wing fittings for rockets and bombs. Normal range without wing-tip tanks, is said to be 1,725 miles. It has a rate of climb of 6,000 feet per minute at sea level, a gross weight of more than 20,000 pounds and an empty weight of 12,000 pounds. The *Voodoo* has a wing span of 39 feet 8 inches; is 54 feet 1.4 inches long. Production version will be designated F-88A.

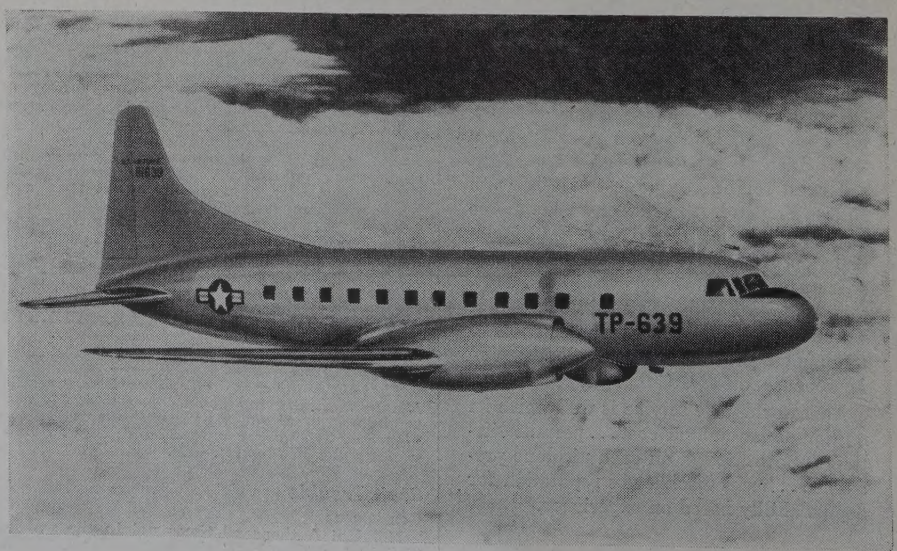
Stall Warner

The Navy is experimenting with a new stall-warning system developed by Safe Flight Instrument Corp., White Plains, N.Y., as a means of reducing accidents to jet fighters and bombers as they come in on aircraft carriers. The Safe Flight-developed instrument causes a gentle buffeting in the stick as the plane nears stalling speed and this buffeting increases as the plane's speed continues to drop off. The Navy's "test system" also contains a special addition to give stall information to the carrier's LSO as well as to the plane pilot. Lights mounted on the leading edge of the aircraft's wing and actuated by the same sensing instrument which sets up the stick shaker will tell the Landing Signal Officer how close to stalling speed the approaching plane is. Color of the lights is the indicator. A series of lights mounted on a panel near the LSO and which are activated electronically from the approaching plane is also being tested by the Navy.

Rocket 'Copter

Announcement has been made of the development of the first rocket helicopter, a design by Rotor-Craft Corp., of Glendale, California. The rocket 'copter, known as *Pinwheel*, weighs less than 100 pounds and is designed to carry one man and special armament at a rate of climb never before held possible for helicopters. Liquid fuel rockets, self-starting and throttle-controlled, are mounted in the tips of two small rotor blades. The rotor is attached to a steel tube which curves downward to support fuel tanks, a pilot's seat and cargo hook. Another tube, extending backward from the rotor hub, carries a small rudder, and still another tube extends forward and down to become the pilot's control column. Ground tests on the 'copter are now being made by the military services.

FLYING CLASSROOM is name given this turbo-prop-powered (3,000-hp Allison T-38's) plane



HELICOPTERS in Korea recently flew an entire battalion of Marines into battle. Operation was completed in six hours and 15 minutes

New Skyraider

A new model of the Navy carrier-based *Skyraider* series recently was announced by the Navy Department's Bureau of Aeronautics. Designated AD-5, it is the first "multiplex" airplane ever to be built. It was designed by Douglas Aircraft Co., for easy conversion aboard Navy carriers into more than a dozen combat types. This so-called "12 in 1" utility is accomplished through packaged conversion kits supplied as equipment with each plane.

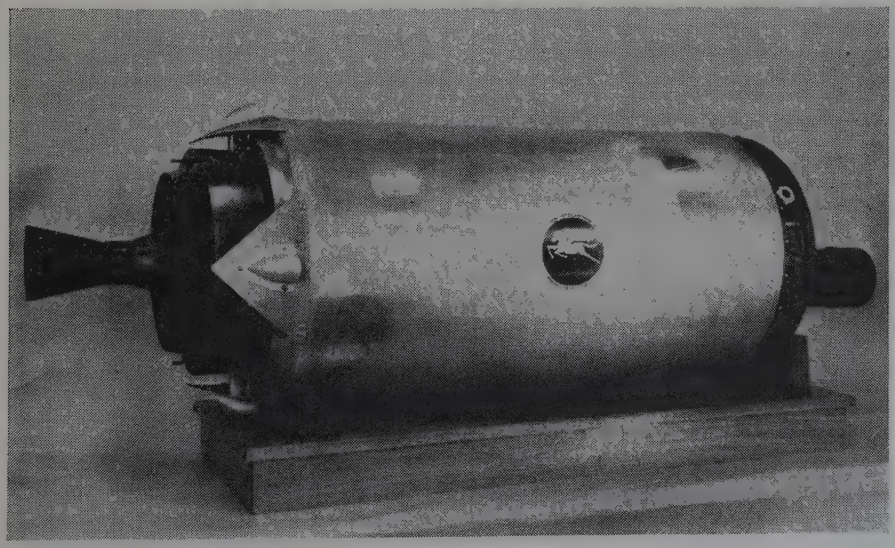
The AD attack bomber can be speedily transformed into a passenger transport, or by conversion kit, into an aerial ambulance with litters. For emergency evacuation or combat assault, it can carry troops and equipment. Despite this adaptability, there is no compromise to its effectiveness as a hard-hitting attack airplane. The AD-5 is capable of transition into day and night attack types or anti-submarine hunter-killer combinations. It may be converted into an airborne early warning or radar countermeasure plane, a tow target or photographic plane, or into other special types.

Basically, the *Skyraider* is a single-place attack type powered by a Wright R-3350 26W engine.

Two New Sabres

The Air Force has ordered production of two advanced models of the sweptwing F-86 *Sabre*. The new versions of the *Sabre* are the F-86F and the F-86H. Both new models will be powered by the more powerful J-47 General Electric jet engines and both planes will be in the "over 650-mph class." The F-86H will be slightly larger than current *Sabres*, but generally will be the same as the present F-86E. It will have an improved suspension and release mechanism for carrying droppable wing tanks in conjunction with bombs or rockets, and other armament will include .50-cal machine guns. The entire horizontal tail surface will be power-boost controlled as in the F-86E, and the "H" model will have an improved-type pilot seat ejection mechanism.

FAIRCHILD has announced development of new turbojet, J-44; delivers 1,000 pounds thrust



News Notes

AIRESEARCH MFG has been awarded the largest production order ever let by the military for small gas turbine engines. The order specifies auxiliary gas turbine engines, air turbine starters and control valves for seven types of Navy turbojet and turboprop planes made by five major aircraft companies.

FAIRCHILD has announced the development of a 1,000 pounds thrust turbojet engine. It bears the designation J-44, and is about 6 feet long and 22 inches in diameter.

CHRYSLER has been awarded a multi-million-dollar contract from the Navy to prepare for the production of Hamilton Standard propellers under an engineering assistance and license agreement with the Hamilton Standard Division of United Aircraft Corporation.

NORTHROP flight mechanics set a record recently when they made a complete powerplant change in a *Scorpion* F-89 in 20 minutes, 50 seconds.

ENGINEERING & RESEARCH CORP. has developed a flight simulator for training of F-86 *Sabre* pilots. Named "Flightronic," it is first fighter all-weather simulator delivered to the United States Air Force.

Frontier Guardian

By T/Sgt. HAL BAMFORD

Special to SKYWAYS from 36th Fighter-Bomber Wing, Furstenfeldbruck Air Base, Germany

The 36th Fighter-Bomber Wing under the able command of Colonel Robert L. Scott, is building a reputation in Europe that has seldom been exceeded by any other group in the history of flying.

On occupation duty a scant 10 minutes jet flying time from the Iron Curtain, the Wing through its record smashing feats of flying time and gunnery records is becoming the toast of the Air Force, and through its famed "Skyblazer" aerobatic team, they are likewise becoming the toast of Europe.

On recent gunnery training missions, the three squadrons of the 36th Fighter-Bomber Group, the tactical arm of the Wing, set records that were believed impossible.

Colonel Scott, who authored the famed wartime best seller, *"God Is My Co-Pilot"* and who served with General Claire Chennault's "Flying Tigers," recognizes the value of preparedness. And Colonel George T. Lee, who commands the group and is credited with having flown more combat missions than any other American flyer during the last war, is equally aware of that necessity.

As a result, the Wing has embarked on a training plan that is paying handsome dividends. Both men are guiding their subordinates through a program such as few groups have ever before undertaken.

For example, in one recent month the three squadrons combined for a total of 4,149 hours 30 minutes flying time in the F-84 *Thunderjet* which they fly. They logged an additional 232 hours in T-33 two-seater trainers to bring their total jet time during the month to an astro- (*Continued on page 39*)

SKYBLAZERS of the 36th Fighter-Bomber Wing roar over Bavarian Alps during a practice session. The airplanes "Skyblazers" fly are F-84 *Thunderjets*. Lead man is Capt. Evans

U.S. AMBASSADOR to Denmark Mrs. E. Anderson greeted Col. Scott and "Skyblazers" in Copenhagen. Men are (*left to right*) Capts Buck and Bill Pattillo, Damewood, Evans, O'Brien

AEROBATIC TEAM roars over Kastrup airport at Copenhagen during ceremonies in which five F-84's were presented to Danish government. "Columbine" is Gen. Ike's *Constellation*

PRACTICE means long hours of formation flying. Here, "Skyblazers" are locked in tight diamond formation. Alternate ship, not shown here, fills in at any of the four spots

CASA ALCOTAN is a twin-engine feeder-liner designed specifically to fly Spain's internal air routes that connect 15 cities. The plane seats 10 or 12 passengers, carries crew of two over range of 621 miles at 180 mph

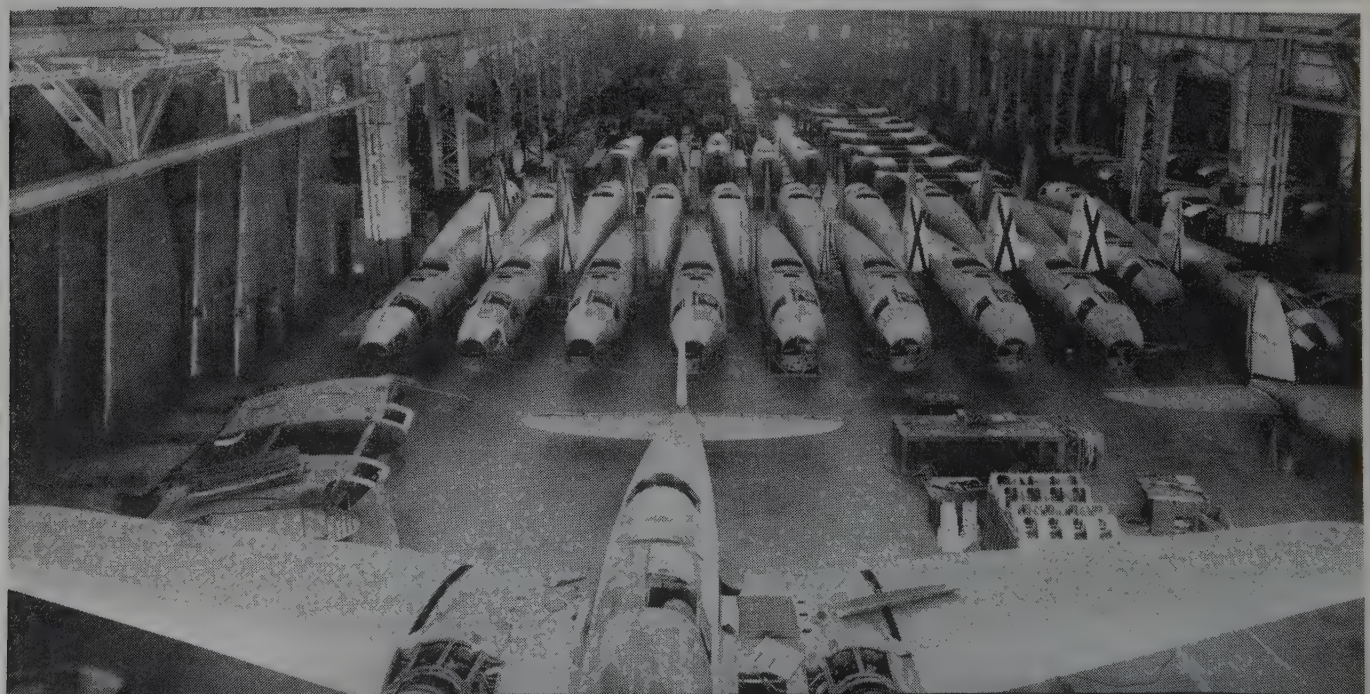
Air Aid From Spain?

General Eduardo Gonzales Gallarza, Spain's Air Minister who recently spent a couple of weeks in the United States visiting airfields and airplane plants, reported in Madrid, on his return, that the USAF was the greatest guarantee for peace in existence. He also said that the *Ejercito Del Aire* (Spain's "Army of the Air") could be developed quickly to undertake a major role in the air defense of the West *providing* the United States gives Spain ample economic assistance with which to develop her airplane industry.

Generalissimo Franco. clinging tenaciously to the

IBERAVIA I-11 is one of Spain's most recent lightplane designs. Reminiscent of the All American *Ensign*, the I-11 is a side-by-side two seater with fixed undercarriage. It has top speed of 122 mph, cruises at 108 mph

GERMAN-DESIGNED HE-111 bombers were built in the CASA plant at Getafe. Spain was licensed to build this German bomber, and the Nazis supplied the jigs and tooling as well as skilled technicians and advisers

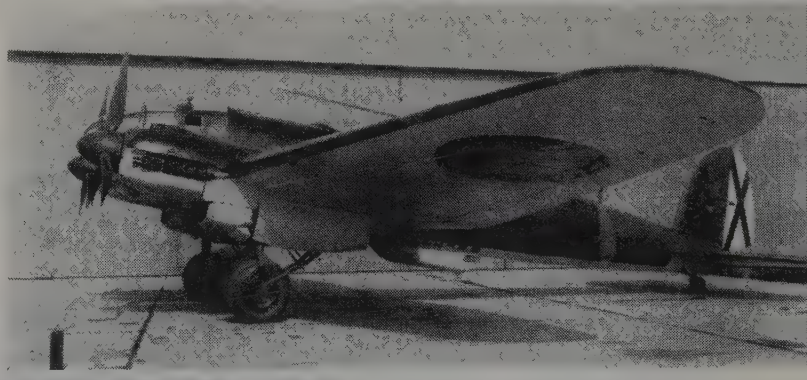


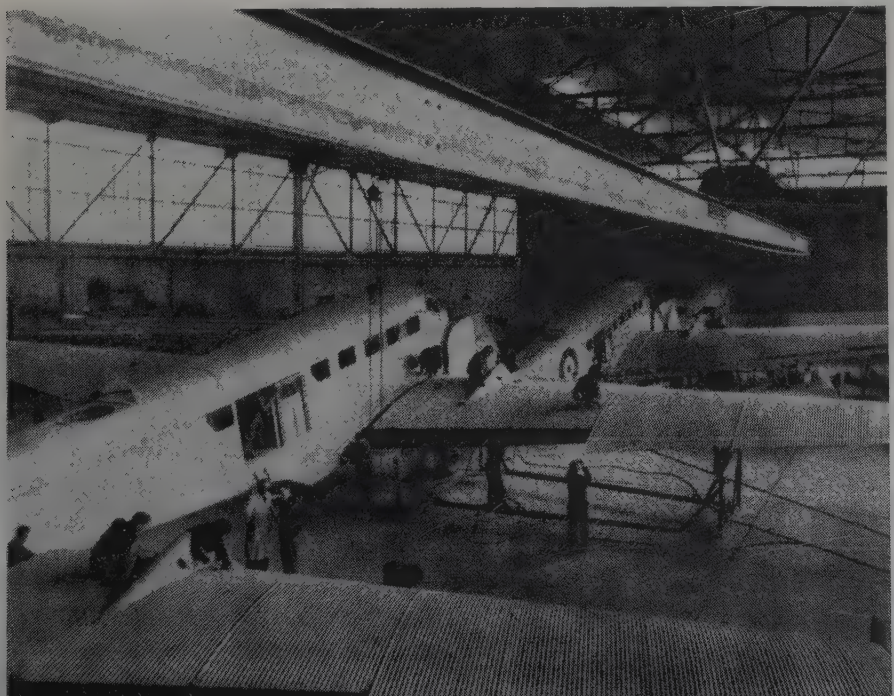
BU-131 TRAINERS, designed in Germany but licensed for production in Spain in early 40's, are still in use

ME-109, the Spanish-built version of the Nazis' World War II fighter, is powered by Hispano H.S. 109J engine

reins of his regime, said in an interview with a U. S. radio commentator, ". . . the Atlantic Pact without Spain is an omelette without eggs," and it must be admitted that there is an element of truth in his words for, strategically, Spain is a vitally important component of the over-all Western defense picture.

Seriously worried by Spain's internal economic difficulties but still outwardly unperturbed by adverse world opinion, the Generalissimo is sure of getting the economic aid that he desires for, as much as we may dislike his regime, he knows that to allow the Communists to get a stranglehold on Spain—not so difficult a task in her present weak state—would be allowing the Reds to gain control of the Mediterranean area. The Red factions that have lain dormant in Spain since the Civil War would welcome the opportunity to bring about Franco's downfall and the *coup* *(Continued on page 40)*

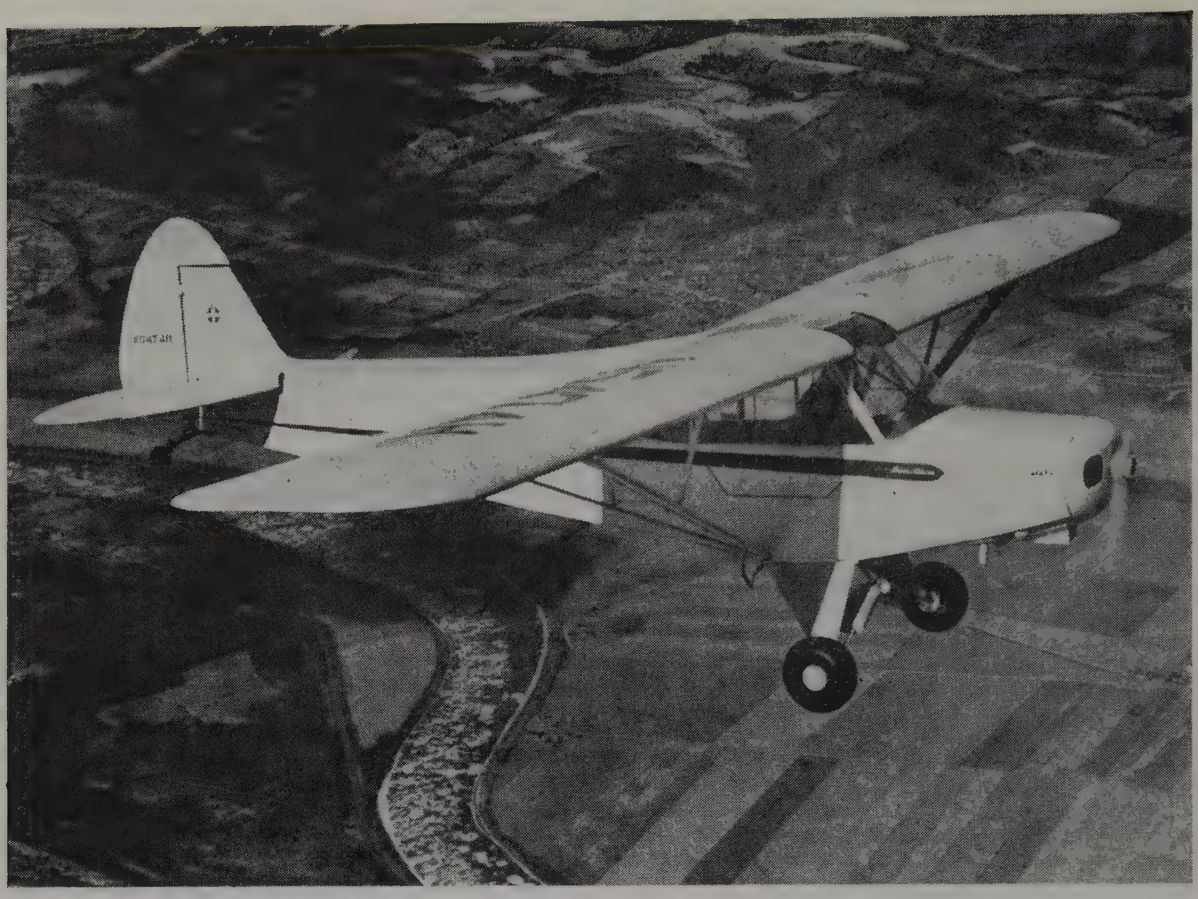




HE-111 bomber of the *Ejercito del Aire* was ordered in quantity (236) from CASA *(Construcciones Aeronauticas S.A.)* to rebuild Spain's air forces. Wings were built at the Seville plant

JU-52, a tri-motored troop transport, also was ordered by the Spanish "Air Army." This was built at the Getafe plant of the *Construcciones Aeronauticas S.A.* One hundred JU-52's were delivered

By WM. GREEN



CLIMB YOUR CUB to 3,000 or 3500 feet and practice slow flight. You can fly at 40 mph, 1500 rpm, but it'll be sloppy

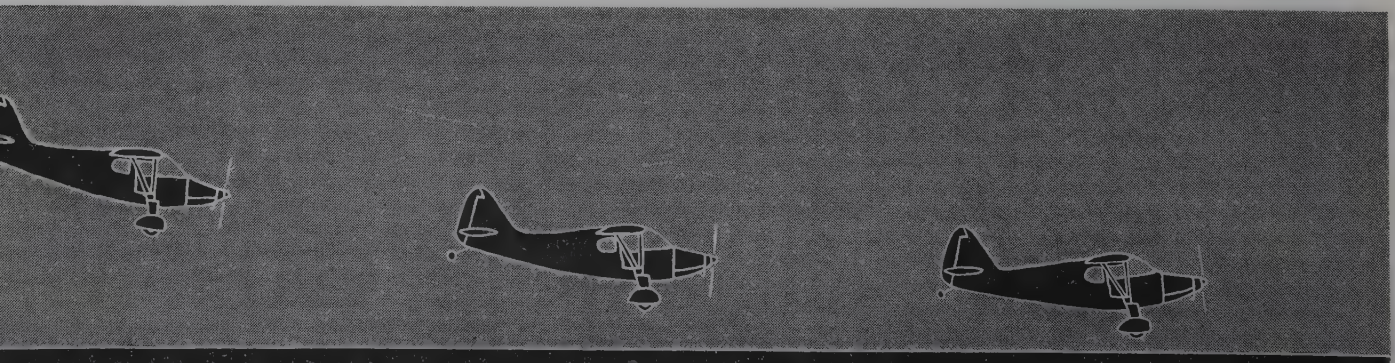
Bold Pilots *Do* Grow Old

By FRANK L. HARVEY

IT'S ALL in your definition. If your idea of a bold pilot is a fellow who gayly zips upside down under his girl's grape arbor, then the old adage is right: "There are old pilots . . . and bold pilots . . . but no *old* bold pilots."

But I've got a different definition. The grape-arbor buzz boy isn't bold—he just has a few loose screws in the brain box. The really bold pilot is the fellow who can sail into a tough situation in the air without becoming all knuckles and elbows and winding up sitting amidst his own wreckage. There is no use denying that there are hazards in flying and if you expect to be anything except a Saturday-afternoon amateur, you can't wait for

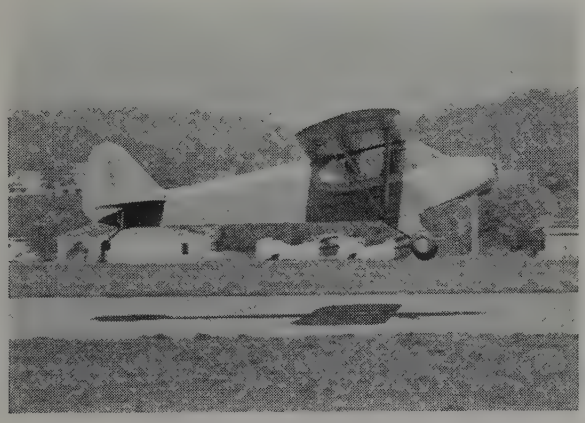
WHEEL LANDINGS, correctly done, require a good deal of practice. Carry about 1500 rpm on your let-down. Come down



perfect weather and an 8-mile breeze straight down the middle of the runway. After you solo and get your private license, the Saturday-afternoon routine will get a little dull. You'll want to head off over the distant horizon—where there may be thick haze, bumpy thermals, rugged crosswinds, rough-looking forced landing country, sudden heavy rains, confusing cloud formations, snow, smoke. Some of these conditions can and do arise with startling suddenness, and unless you are prepared, you may find yourself in real trouble. That's why I strongly advocate boldness *while you are still in the familiar neighborhood of your home field where things are under control.* Set up a course of calculated risks which you feel will toughen you and build up your skills—and then expose yourself to these risks thoughtfully and deliberately. Start on the easy ones and practice until you are *sure* you can go on safely to something a little more rugged. It may take months—or weeks—depending upon how often you fly. But after you have completed your self-imposed "bold program," you'll be safe whether you are flying at home or 3,000 miles away.

Let's start with landings:

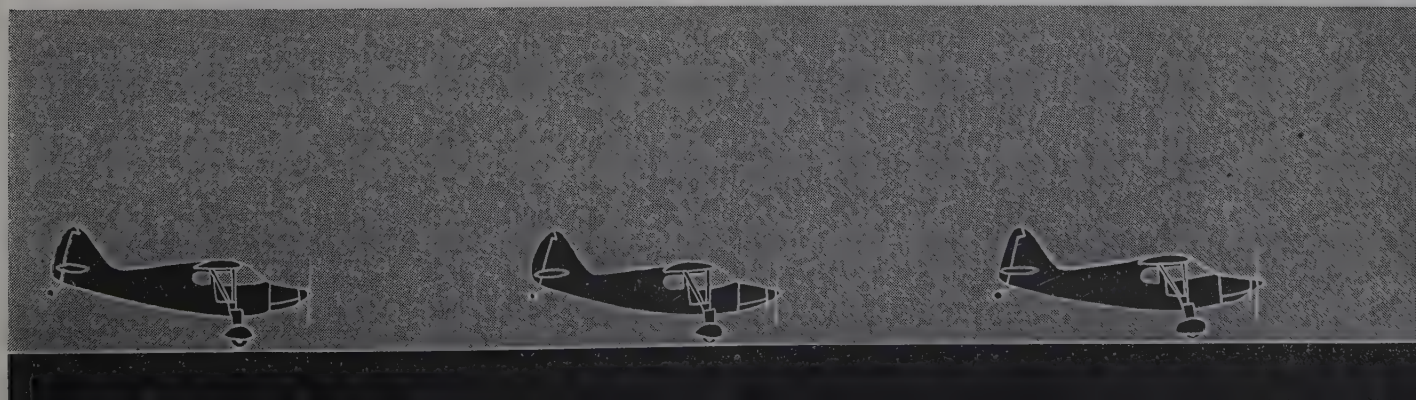
It isn't sufficient to be able to grease your airplane on in a perfect three-pointer while headed into the wind. You must be able to execute perfect wheel landings, crosswind landings, and what the Navy used to call "field carrier landings." Wheel landings have given everybody trouble at one time or another. It took me many sessions which ended in crow-hop fiascos to get the wheel landing down pat. Perhaps my slow progress did me good in the end. Anyhow, here are some tips for what they are worth. First off, try your wheel landings in a Piper J-3 if you can. It has a nice stiff gear and once you've got it on it tends to stick. I used an Aeronca *Champion,* which is a fine airplane in many ways, but tough to make a wheel landing with because of its soft springy gear. Unless you wheel a *Champ* on just right, it tends to act (*Continued on page 42*)



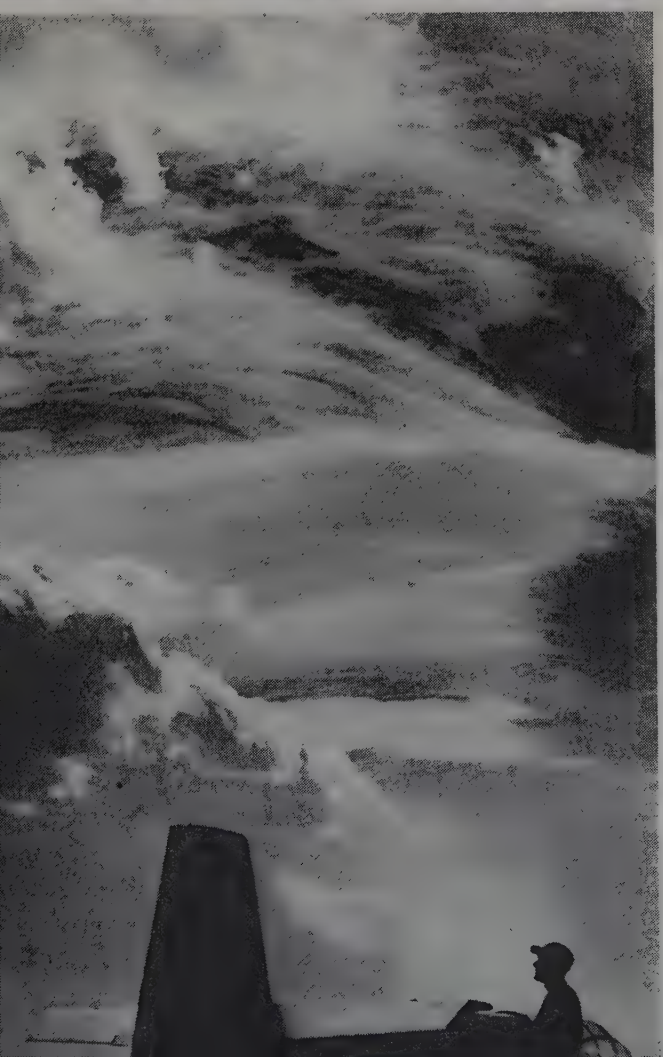
PLANE, on wheel landing, carries 1600 rpm, little nose high

TAXI your airplane as slowly as possible in a high wind; depress the elevator if taxiing downwind, use aileron if in crosswind

final with nose in slow-cruise position. At moment wheels touch, relax back pressure, give a little forward pressure



Rip Tide in the Sky



WINTER FLYING downwind of the High Sierras is the roughest in the world. UCLA and the Air Force are researching the weather there. Lenticular cloud *(above)* is at 35,000 feet; roll cloud is at 12,000 feet

Study of wild winds of the Sierras may uncover extra lift for plane

By DON DOWNIE

The wildest winter flying weather is in California. Eastern blizzards represent a constant problem to air travel, but the super up and down drafts that occur downwind of the towering High Sierras in California produce the wildest winter weather in the country.

Accurately recorded vertical currents approaching 140 mph, enough to soar a heavy P-38 to 31,000 feet with both engines feathered and flaps down, are not uncommon. Altimeter errors of as much as 3,000 feet on the dangerous low side have been frequently observed by competent pilots flying well-calibrated equipment.

This winter the USAF and UCLA (University of California at Los Angeles) are conducting a joint research program called "The Sierra Wave Project"

SIGNPOST of the turbulent "Sierra Wave" is the lenticular cloud. Beneath upwind edge is area of smoothly rising air; roll cloud offers the turbulence. Symons *(below right)* is building "pressure cooker" for flights

to chart the actual weather conditions that take place on the downwind side of a high mountain when strong winds are present. All flying is being sub-contracted to the Southern California Soaring Association who are furnishing both pilots and sailplanes. The Naval Ordnance Test Station at Inyokern, California, which originated the study, is running the radar and theodolite tracking of gliders.

This program first came to the attention of the Air Force back in 1948 when a photographic B-29 flown by a Lt. Greenfield, from Inyokern, was making a cosmic-ray research run at a constant altitude of 30,000 feet. Greenfield hit the third "bounce" east of the White Mountains near Bishop and his heavy bomber started up. He throttled back to minimum power and increased his speed 25 mph to try to stay down at the required altitude, but his rate of climb remained at 700 feet per minute.

The weather conditions were so extreme that the B-29 pilot drove to Bishop the next day to try to find out what happened. There he met Bob Symons (*"I'm A Rain Maker," SKYWAYS, June 1950*) who originally spotted the "wave" back in 1929 while flying as a passenger with Stan Shoemaker in an old Hisso Eaglerock that had an absolute ceiling of 14,000 feet. On this particular flight the pair made a set of photos near Bishop at 18,000 feet. Ever since that time, Bob Symons has been interested in "the wave."

After listening to a few of the hair-raising stories that Mr. Symons told of "the wave," the B-29 pilot began to find out what had happened to his heavy bomber. Symons told of flying a fully loaded Piper *Clipper* in the wave. At 11,000 feet he stopped the

VERTICAL CURRENTS that soar a P-38, with props feathered and flaps down, have been recorded in this area

COLD FRONT nearing Bishop is shown in this unusual photo. Two hours later Symons soared his P-38 to 30,000 feet

prop and soared to 18,000 feet, only to pull out because of the cold while still reading 400 feet per minute up.

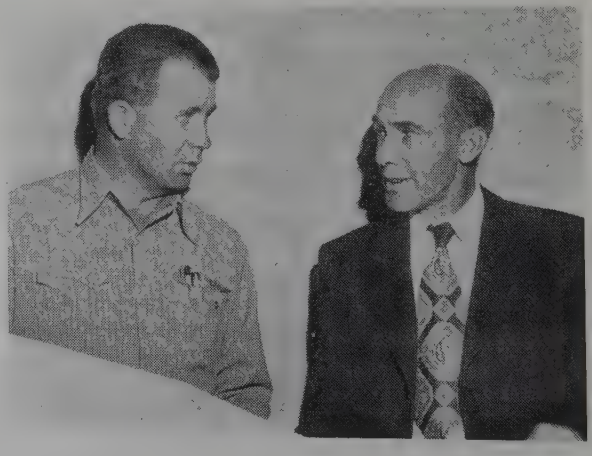
More recently, Symons and German scientist Joachim Kuettner established a new two-place world's record for sailplanes when they climbed 38,650 feet in a surplus Pratt-Read glider. Two of these rugged sailplanes are being used this winter by the Soaring Association pilots, Ray Parker and former national champion Johnnie Robinson, to chart the action of the lenticular clouds and the extremely strong vertical currents that occur beneath them.

Preliminary studies indicate that the giant up and down drafts of the "Sierra Wave" can be found downwind of any high ridge of mountains. They are usually well "sign-posted" by very high, thin lenticular (lens-shaped) clouds of ice crystals. Beneath the up-wind edge of these lenticular clouds can be found a large area of smoothly rising air. Farther down, just about the same altitude as the top of the mountain peaks, there is frequently a "roll cloud" surrounded by extremely turbulent air. Rare cases of extremely dry air have created these same conditions without any clouds.

Vertical currents in this rip tide of the sky can be extremely violent. Former national soaring champion Paul MacCready, Cal-Tech graduate student in meteorology, reported that the "G" meter of his Orlik sailplane read 8.3 positive and 3.3 negative at an airspeed of only 60 mph while entering the wave—a violence requiring study for safety.

Operations this winter are based at Manzanar, just northeast of 14,495-foot Mt. Whitney, the tallest peak in the United States. Here a smooth ridge stretches far enough to produce accurate results. Flights are being held down to 35,000 feet since the whole purpose of the Sierra Wave project is to map an accurate cross section of the phenomenon. Flights are towed into the wave in this area near Manzanar that boasts the "most perfect mountain profile," not complicated by hills or "benches." Zero-lift balloons are also released to chart the cross section of the air. *(Continued on page 44)*

WEATHERMAN Elvin Pye *(right)* talks weather with Bob Symons. Both men are taking part in "Wave" research



MARINE HELICOPTER made successful forced landing in a makeshift "cradle" consisting of tractors, life rafts

Helicopter "Save"

By SGT. LARRY ASHMAN

USMC Combat Correspondent

Just how many times sheer courage and spirit have been credited as the prime factors for the Marines winning out in peculiar situations isn't known statistically. But ingenuity has played an all-important role each time the saucy Gyrenes emerge triumphant from any difficult situation. It was that quality which was credited recently with saving an expensive troop transport Piasecki (HRP-2) helicopter. The pilots were demonstrating a simulated auto-rotation landing at the Marine Corps Air Station on the banks of the Potomac River at Quantico, Va.

Normally transporting seven combat-loaded Marine infantrymen, the HRP-2 was on a routine training flight with only two pilots aboard when the landing gear struck a section of high ground and was damaged not very far from the flight line of Helicopter Squadron One.

Immediately reporting his predicament to the flight tower, the pilot requested emergency instructions and headed his sausage-shaped "whirligig" to the 'copter operating line to await further instructions.

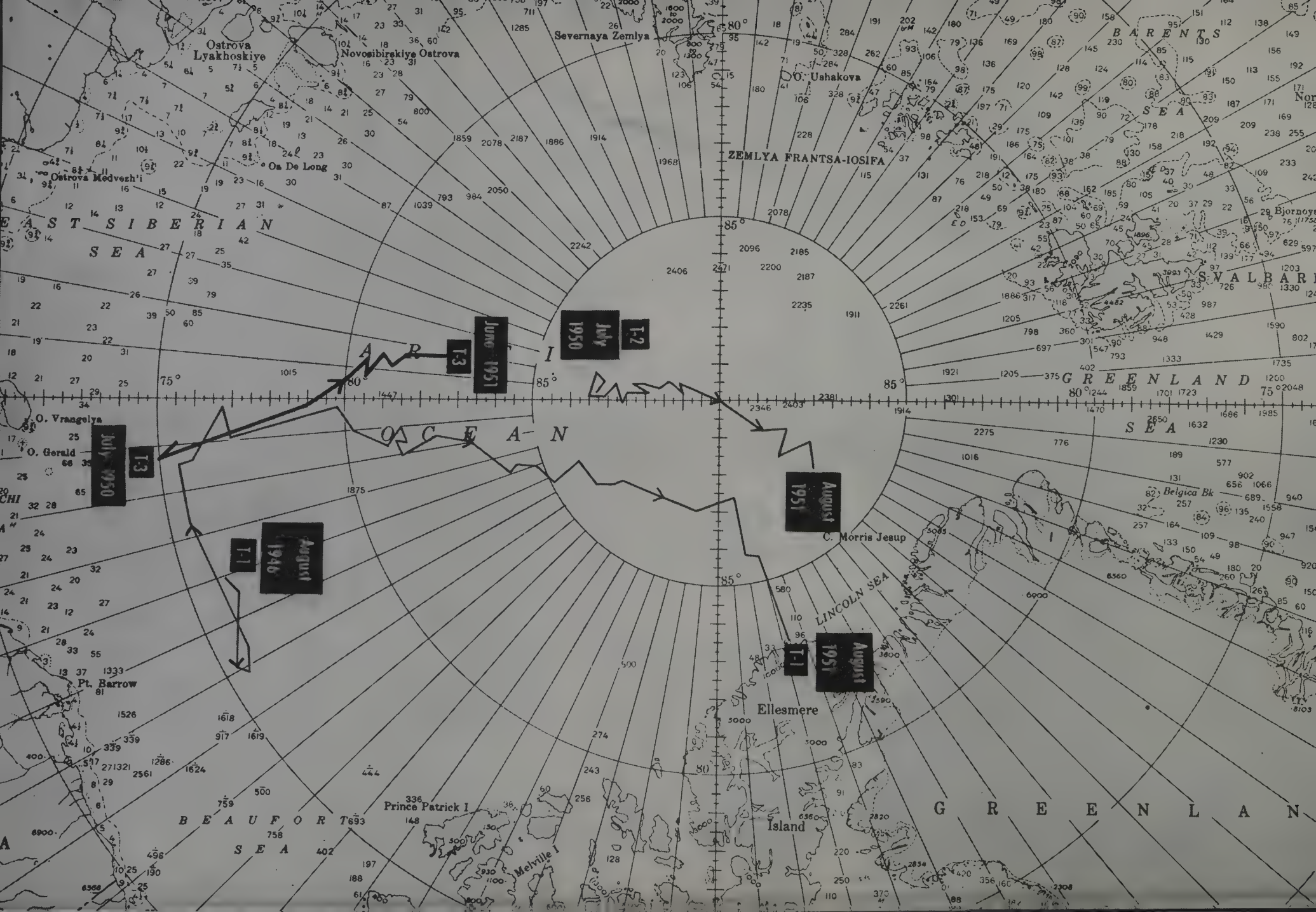
Lt. Col. Keith B. McCutcheon, 36, of East Liverpool, Ohio, commanding officer of the 'copter unit, and his executive officer, Lt. Col. John H. King, Jr., 34, of Brookline, Mass., immediately rushed to the scene and things began to happen.

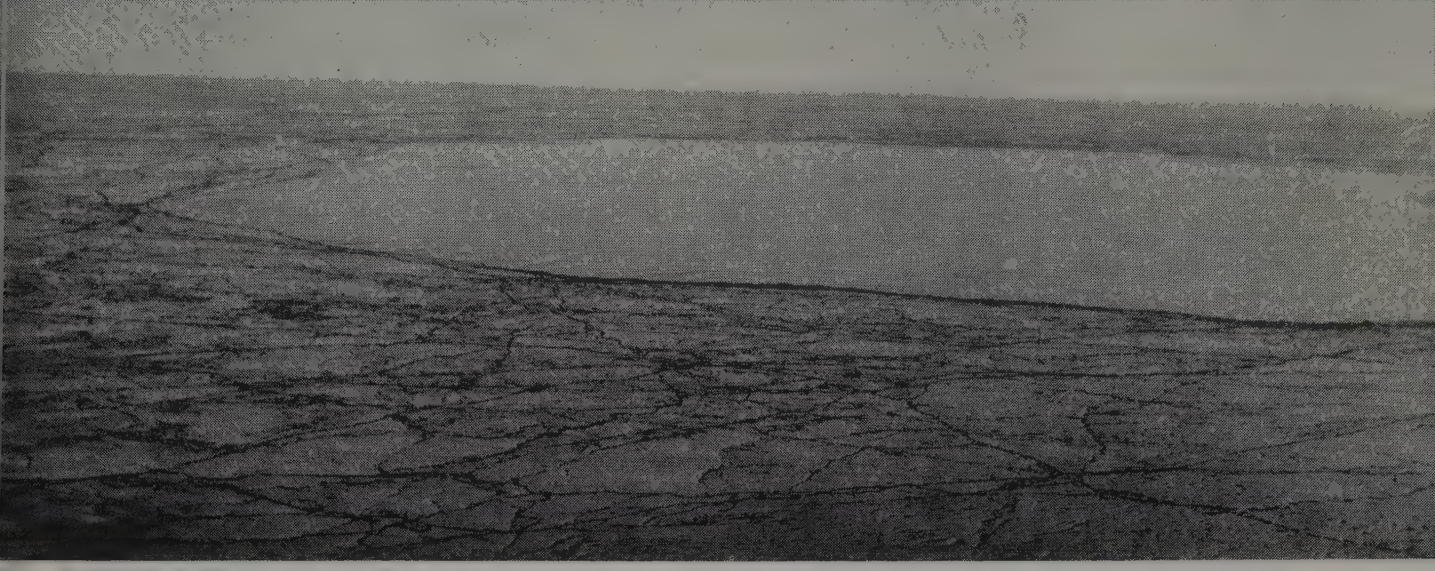
For the first time in the history of helicopter aviation a combination of mattresses, rubber life rafts, and two warehouse "mule" tractors were credited with an "assist" in saving a highly expensive helicopter.

Lt. Col. Keith McCutcheon pulled one out of his hat and conceived the bright idea of constructing a pontoon-like roost to cushion the ailing helicopter's descent.

While the 'copter hovered close to the ground, greedily eating up its fuel supply, two groups of mechanics worked at a furious pace to lasso the helicopter's damaged landing gear and lash the roost together. Communications men hastily set up a field telephone line between the 'copter and Lt. Col. McCutcheon on the ground. One pilot jumped to safety on the tarmac of the flight line and Lt. Col. King was boosted from the shoulders of a mechanic to take his place at the 'copter's controls.

A hair-raising stunt never before tried, McCutcheon issued instructions via the field telephone to King who now had the "egg beater" under control. Gradually the 'copter was jockeyed into position and the pilot set it down in her make-shift roost with a whoosh and wheezy sigh to achieve a new "first" for the always "ready" Marines. An expensive helicopter was saved (. . . and a large-sized hunk of the taxpayer's money), and once again the ingenuity of our fighting men was proved—ingenuity that history records has won many a victory for the American forces.


Severnaya Zemlya
Ostrova Lyakhoskiye
Novosibirskiye Ostrova
O. Ushakova
ZEMLYA FRANTSA-IOSIFA
Ostrova Medvezh'i
Oa De Long
BARENTS SEA
EAST SIBERIAN SEA
SVALBARD
Bjornoya
GREENLAND SEA
O. Vrangelya
O. Gerald
OCEAN
C. Morris Jesup
LINCOLN SEA
Belgica Bk
Pt. Barrow
Ellesmere Island
Prince Patrick I
Melville I
BEAUFORT SEA
GREENLAN
June 1951
T-3
July 1950
T-2
August 1951
T-3
July 1950
T-1
August 1946
T-1
August 1951
75°
80°
85°



AIR PHOTO was made by the Air Force of T-3. It is a solid mass of fresh-water ice, 15 miles long and seven miles wide

Floating Air Bases of the Arctic

Air Force discovers 270-square-mile ice island that could be an air base

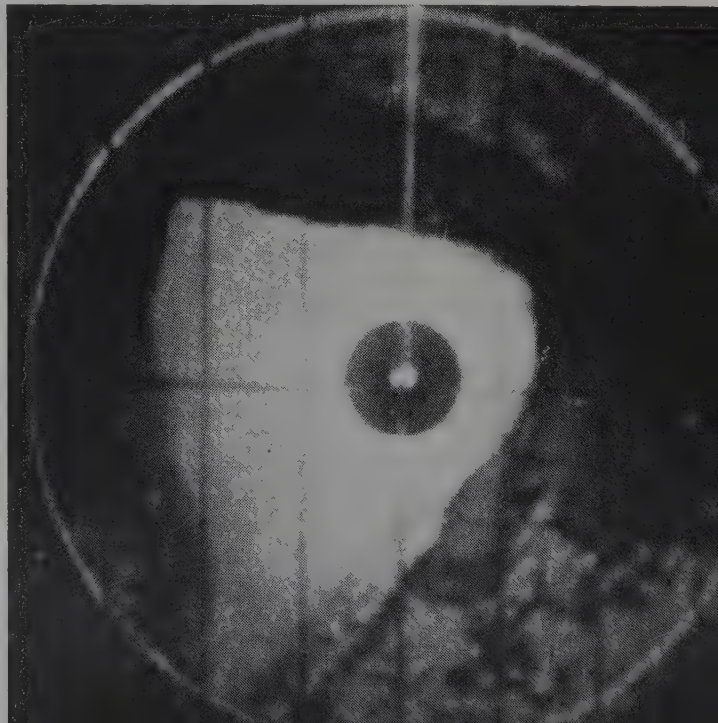
By RONALD SCHILLER

On August 14, 1946, a U. S. Air Force patrol plane flying through heavy fog 300 miles north of Point Barrow, Alaska, picked up on its radar screen the clear outline of an island 15 miles wide, 18 miles long, where no island was supposed to be. The plane commander photographed the image on the screen and raced back to his base. A special courier relayed the picture to the Pentagon, where it aroused a blizzard of excitement. A hitherto unknown island, as large as Guam, situated in the Arctic Ocean? It could have an important bearing on American military strategy were war to come with Russia. The lid of secrecy was clamped down tightly, while high brass and big planes roared north to investigate.

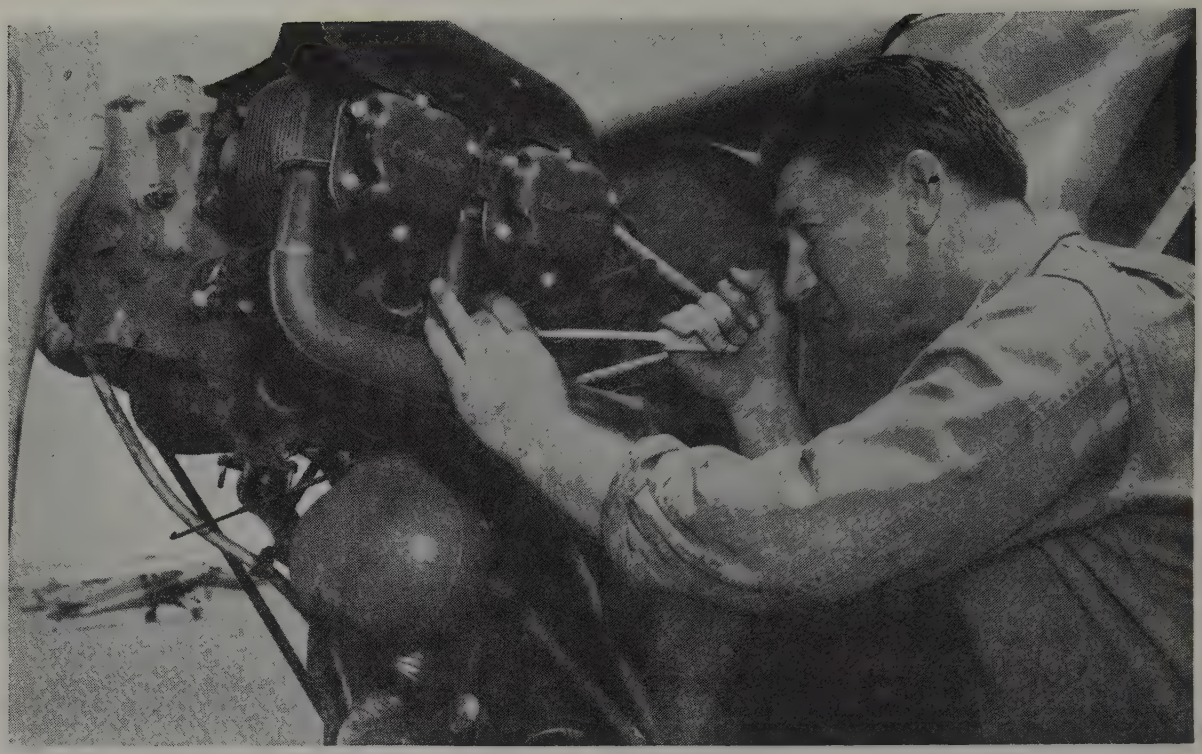
Maddeningly, a solid undercast continued to blanket the Arctic for several days after the discovery; exploration had to be done entirely by radar from 18,000 feet. But succeeding flights had trouble locating the island—it was always a few miles east of its last reported position. This was attributed to faulty charting, and irate generals made some pointed remarks to young navigators.

Finally the fog lifted, and observers were amazed at what they saw. The mysterious island was a triangular 300-square-mile slab of ice. But it looked totally unlike the fragmented, churned-up pack ice that surrounded it. Its completed sides rose from 30 to 50 feet above the sea, meaning that, since seven-eighths of the mass of all floating ice is below the surface, it was from 200 to 400 feet thick, as contrasted with the three- to 12-foot thickness of pack ice. From its pale blue color and its texture it was recognized as fresh- (*Continued on page 45*)

MASSIVE T-1 showed up like this *(white mass center and left of center)* on the USAF patrol plane's radarscope



POLAR REGION MAP shows movement of three ice islands, T-1, T-2 and T-3. T-1 was discovered in August, 1946, above Alaska's Point Barrow *(lower right-hand corner)*. In August, 1951, T-1 was found up against shore of Ellesmere Island. All three islands are fresh-water ice



TODAY'S PRIVATE PILOT can keep his maintenance costs down by doing about 90 per cent of the work himself. All he has to do is to see that a licensed A&E thoroughly inspects his handiwork and signs the logbook

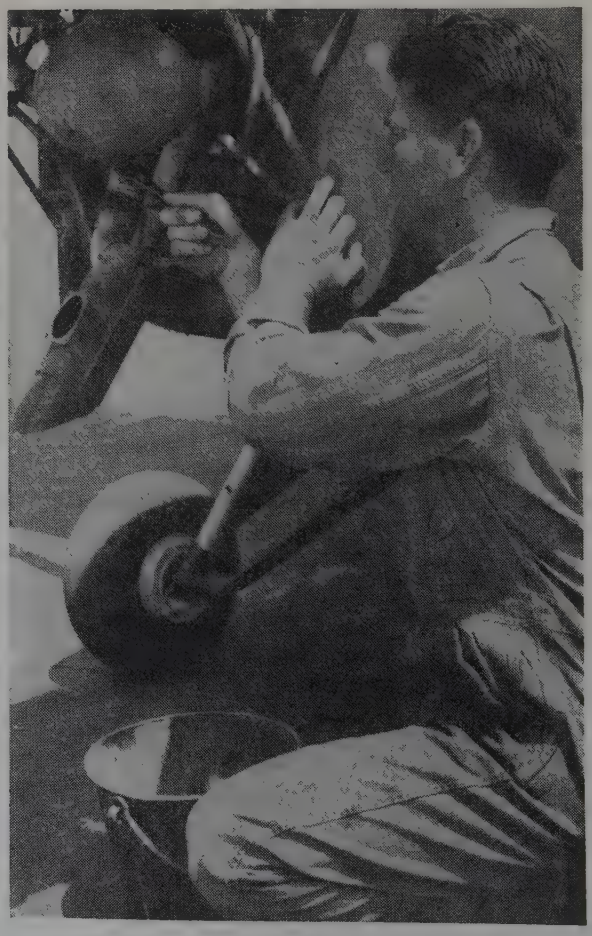
Keep Down Upkeep

A little labor on the part of the airplane owner can save plenty of dollars

By JAMES JOSEPH

"Here lies America's private-plane owner. High maintenance costs scared him to death."

This is the epitaph which rising maintenance costs have helped to erect over many a promising flying career. It's an obituary growing more evident as blunt signs are tacked to hangar walls:



GREASE won't hurt you, so drain your plane's crankcase yourself . . . and save the cost of a licensed A&E's labor

"Mechanic's Labor: $4.00 an hour; $2.50 per half hour."

Aviation experts blame private flying's post-war doldrums, instead of its prophesied heyday, on the high cost of plane upkeep. For that $4.00-an-hour, $2.50-per-half-hour labor, charged by an A & E worth his license, has sent too many future flyers scampering for their automobiles, convinced that flying is still a rich man's sport.

Sure, you can buy a little ship for $500 to $1500. But it's like my wife said as I plunked down the two bucks for the marriage license, "Honey, wait until you get the bill for maintenance."

Yet hundreds of private pilots who aren't pecuniarily loaded fly and will keep flying. The reason: they aren't afraid to get their hands dirty, nor are they hesitant about diving in where others, less venturesome, fear to tread.

One among these hundreds is Los Angeles' Bill Howes. The other day a fledgling owner sauntered over to watch Bill as he tore into his Ryan PT-22.

"Hey, Buddy," the fledgling asked, "you an A & E?"

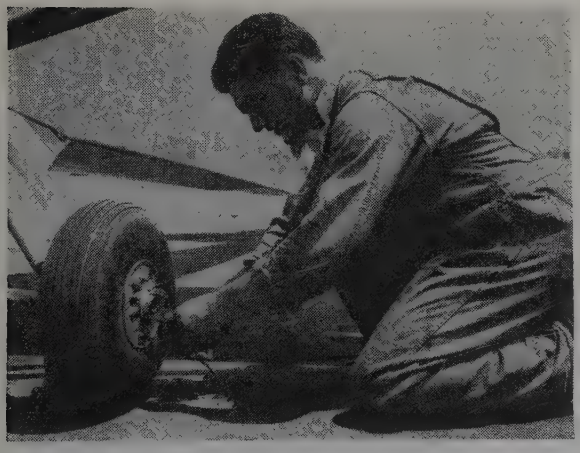
Howes stopped draining the lube oil from the Ryan's engine, wiped a greasy paw on a rag, and looked up. "Heck no," he retorted, "but you might say I'm doing the same kind of work on my own plane. Got to. Wouldn't be flying if I didn't. Can't afford that four bucks an hour."

"But . . . but . . ." stammered the fledgling, "I thought CAA regulations said you couldn't work your ship over unless you were a certified A & E?"

This being Bill Howes' favorite subject, he proceeded to initiate the novice fly-boy to the facts of aircraft maintenance. Howes explained that any pilot can fix his own ship, do nine-tenths of the work himself, and save plenty in the process.

"All you have to do," explained Howes, "is to get an A & E to watch (*Continued on page 50*)

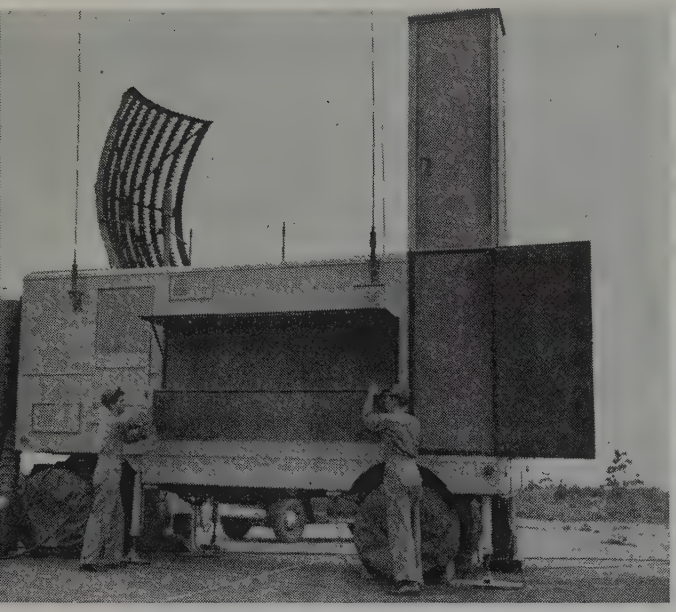
ANNUAL BILL can be a picnic instead of a panic if you do the little jobs, like tightening all screws *(above)*, yourself. Oiling all moving parts, *i.e.* hinges, cables, etc., *(below)* will keep maintenance costs down, too



LITTLE THINGS keep you airborne . . . and little things can ground you permanently, too. Don't be afraid of work

SAVE an accident a year by checking your brakes. You can do these things yourself, but have an A&E check you

Airmen of Otis AFB, Mass., keep 24-hour watch over East Coast area



GCA OPERATORS open radar transmission screen on their unit preparatory to going on duty at this all-weather base

SABRES are lined up on the runway at Otis AFB, Mass., ready at a moment's notice to take off to meet an enemy

When storm clouds roll in off the Atlantic seaboard, most Cape Codders batten down the hatches to wait out the danger.

Not so with a small group of highly trained jet fighter-interceptor pilots at Otis Air Force Base. As the salt spray lashes the Shad boats and blinding rain whips the runways of the base, these airmen, veteran pilots of the 33rd Fighter-Interceptor Wing, go on a standby with their sleek, powerful F-94 all-

ALERT sounded, these jet pilots of 33rd Interceptor Wing hurry to their F-94's from the Otis AFB portable ready room

East Coast Alert

GCA CREW directs a plane to safe landing during bad weather conditions. F-86's, F-94's are on 24-hour duty

CREW CHIEFS take a break as they stand by for air alert signal which will send their F-94's to intercept invaders

weather jets jutting stubborn jaws into the storm.

This is a job most airmen shun. These are the pilots who take to the air in the black of night and under the worst weather conditions to ferret out and destroy any enemy aircraft who might try to sneak in for an attack on our vast East Coast metropolitan and industrial areas.

Only lean jet minutes away from New York and Boston, these airmen realize the importance of the mission to which they are assigned—to protect the millions of fellow American citizens working, playing and sleeping miles below.

With the noses of their ships crammed with the latest radar equipment, the F-94's probe the darkness and clouds lying over our Eastern approaches for the unannounced visitor who might be carrying a lethal bomb capable of destroying a vast city in a matter of seconds.

It is the pilot and his radar operator who have the final phase, but a vast horde of supporting actors work continually to stage this great, lonely drama high in the heavens.

It's the story of planning, preparation and practice—continuing practice to keep proficiency at the highest possible level at all times. From the lowest ranking maintenance men to the Commanding Officer, the importance of the 33rd Wing's mission is ever emphasized.

When the skies clear and the fishing boats again head for waters off the Cape, a salty skipper may crane his weather-beaten neck as the high-pitched whine of an F-86 *Sabre* fighter shatters the cranberry countryside.

These are the men who take over when the F-94 pilots knock off for a few hours' rest before returning again to their bleak watch. The *Sabre*—world's fastest airplane according to official speed records—forms a robust complement to the needle-nose F-94 for all-round, all-weather protection against surprise enemy attack.

Otis Air Force Base, nestled on one of America's favorite summer playgrounds, reflects uniquely its ultra-serious role. Gone is the manufactured preparedness of a training station. Gone also is the relaxed certainty that its men may be called upon for a specific job sometime in the hazy future. This base has the aura of an overseas airfield. Each time an alert is sounded, the invisible question lurks in every mind: "Is this one it?"

This attitude and the mission of the wing was explained by Capt. Louis (*Continued on page 41*)

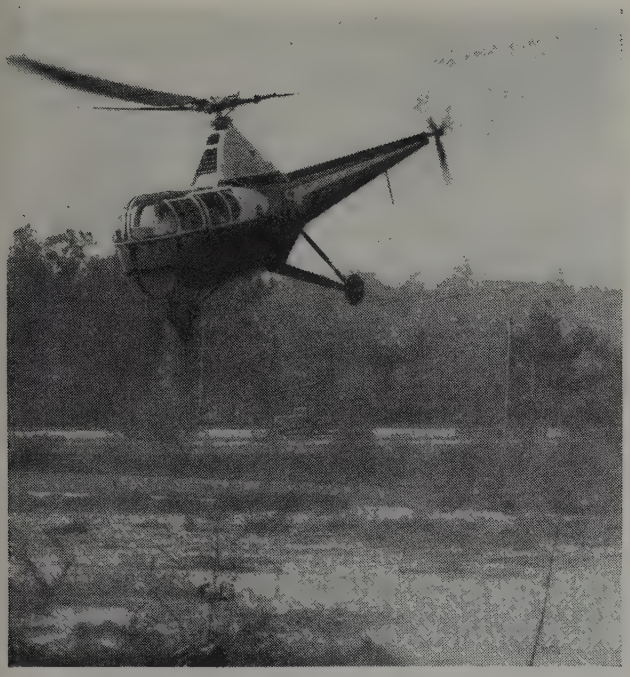
GUARD DUTY is this soldier's job. He is among those detailed to keep a close watch on the All-Weather jets

Cops in 'Copters

CHIEF MORRIS climbs aboard chartered Los Angeles Airways' helicopter for flight over Pasadena's Tournament of Roses Parade area

'COPTER PILOT for the Traffic Department flight was Fred Milan, shown here at 'copter's controls

ROSE BOWL game annually brings millions of people into the Pasadena area. Only way to direct traffic is from the air



HELICOPTER used for traffic surveying makes a landing on a small spot off the beaten track of in-coming cars

NEW YEAR'S DAY crowd is said to bring in between 350,000 and 400,000 automobiles on just that one day

As throngs push into Pasadena on New Year's Day, traffic is controlled by police in the air

By CLARENCE MORRIS

Chief of Police, Pasadena, Calif.

Think *you* have a headache on New Year's Day? Every January First, we handle the largest crowd in the world here in Pasadena. Visitors from all over the United States jam themselves into our 22-square-mile city for a view of the Tournament of Roses Parade, the Rose Bowl football classic and the horse races at nearby Santa Anita. In all, well over a million people are sardined into our town on that one day. And do we have a traffic problem!

I've been in the air every time we've had a parade and football game for the past 13 years. It's absolutely the only way to direct traffic.

I've spotted traffic from a TWA DC-3, a Navy "M" blimp, Howard Hughes' blimp that vigorously advertized "The Outlaw" much to the chagrin of our Tournament of Roses Association, and last year for the first time from a helicopter.

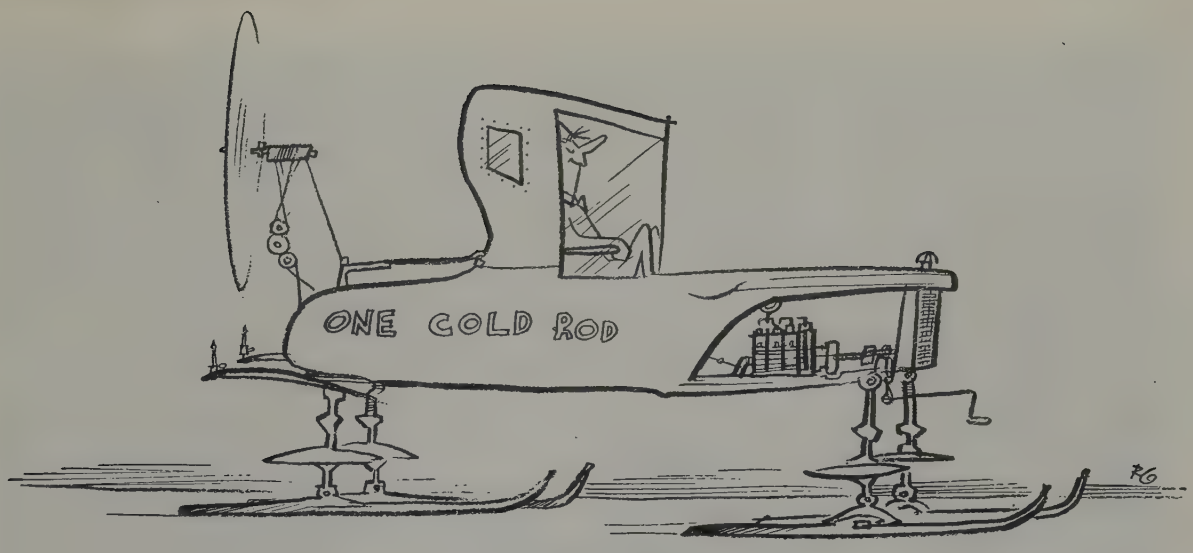
There's no getting around it, the slower flying rotary wing aircraft is the best for surface-traffic control. A DC-3 cruising at 150 mph is a little fast for spotting small but jammed intersections, and then radio corrections. The blimps are excellent, except that usually there are too many people aboard who have different things they want to see. Just about the time I've spotted a traffic jam that needs taking care of, a newspaper photographer announces he wants to take "just one more picture, please" of the main line of march.

It is difficult to estimate the exact number of vehicles in Pasadena on New Years' Day. Our general guess of the parade crowd alone is between a million and a million-and-a-half people. Our own population is just over 100,000. Add 103,000 who attend the Rose Bowl, the 50,000 to 60,000 who attend the races at Santa Anita and the visitors who come just to see the biggest free show in the world, the Rose Parade, and you've congregated quite a mob.

We estimate that this million or a million-and-a-half people bring in between 350,000 and 400,000 automobiles on this one day. That doesn't include the many special sections of Pacific Electric interurban trains that are added to the regular runs. To keep this mass of motion moving smoothly is a major problem, and the lessons we have learned here in Pasadena could be applied to any large metropolitan area, should a major disaster, regardless of cause, strike the population.

True, in Pasadena we are able to anticipate the time and volume of expected traffic. We bring in 1200 additional policemen from Los Angeles and nearby communities and give them simple printed instruction sheets outlining their duties. In addition, we have our full force of 212 men with 29 radio-equipped cars and 23 radio-equipped motorcycles. We handle all calls through our regular radio station KGJX. (*Continued on page 49*)

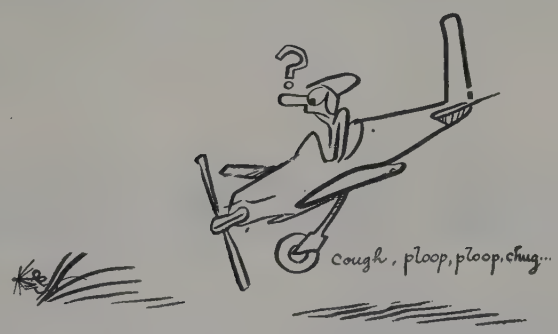
"If Dil doesn't nose away from that stall, he's in for a fall!"



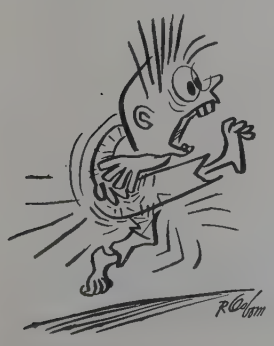
DILBERT

By S. H. Warner and R. Osborn

Sub-Conscious — I was seven that 4th of July and loaded for bear —a pocket full of fire crackers, the second size above "lady fingers," and a stick of punk to light them with. After setting off a half-dozen bangs, I decided to save the rest. So I rammed the punk into the ground to put it out, and stuck it in my pocket.



About a minute later all hell broke loose. My fire crackers started going off, first by ones and twos, and then in salvos. I ran around in circles, screaming and beating on my overall pocket with both hands. I beat until my hands were blistered and burned, but every darn one of those cannon went off in my pocket. When it was all over, I was a mental and physical wreck.

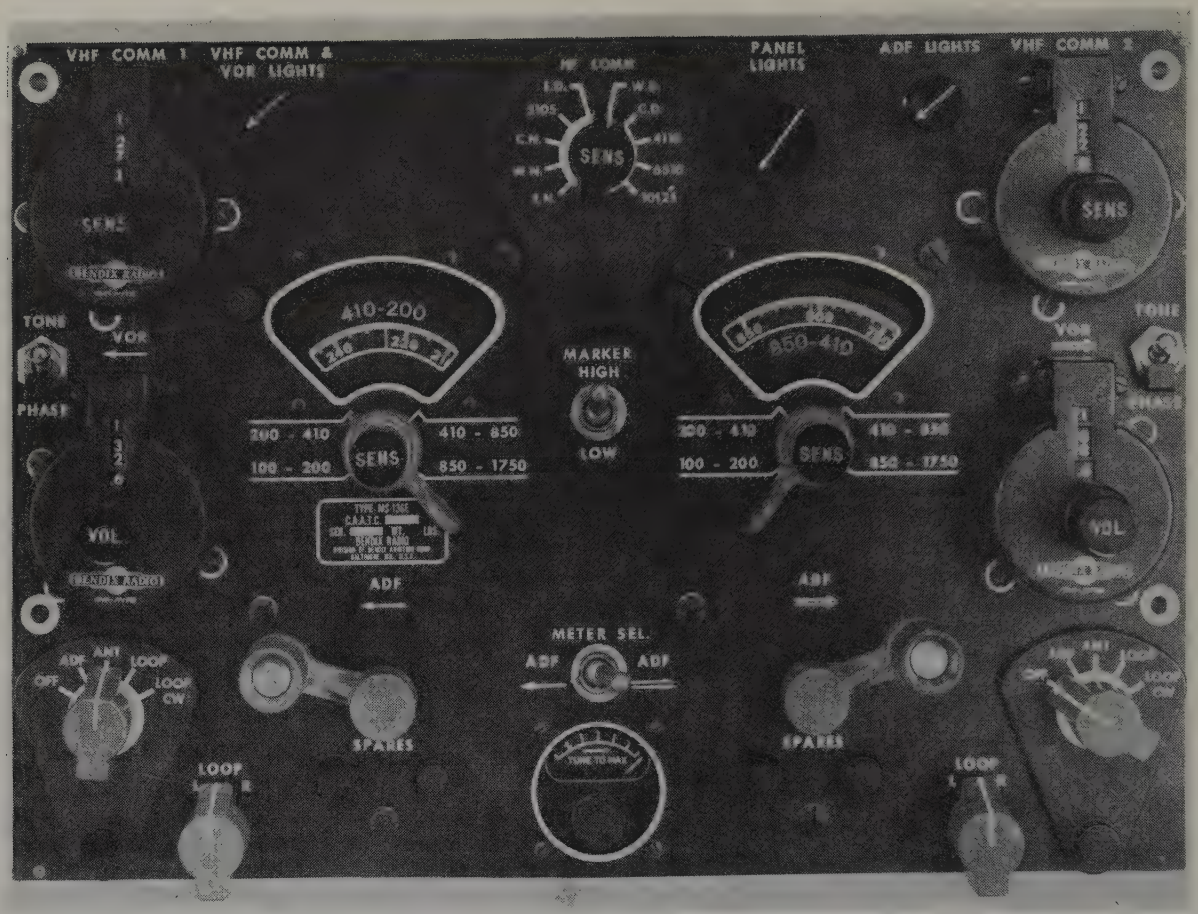


The next summer I was out on my uncle's farm during haying season. I never tired following the hay-loader and watching the hay crawl up on the wagon. One day the loader raked open a nest of bumble bees. That's right, they all jumped on me. And what did I do? Believe it or not, I didn't do a damn thing but run around in screaming circles, *beating on my overall pocket* with both hands. No matter where I got stung, I slapped and pounded my pocket, just like I did when the fire crackers exploded. If my uncle hadn't jumped down and rolled me on the ground, it might have been curtains for little Sethie.

The foregoing is merely a bit of psychological background for Dilbert's latest accident. It was just like my fire cracker-bumble bee episode, only his was in an airplane.

His plane had both a fuel indicator switch and a tank selector valve. A dozen times an hour Dilbert would shift his fuel indicator to check the amount of gas remaining in the various tanks. Then the other day one of his fuel tanks ran dry, and (you guessed it!) he shifted his fuel indicator

(*Continued on page 64*)



CONTROL PANEL, fabricated by Bendix Radio for Chicago & Southern Air Lines, contains ILS, ADF and VHF controls

Radio Needs for Business Pilots

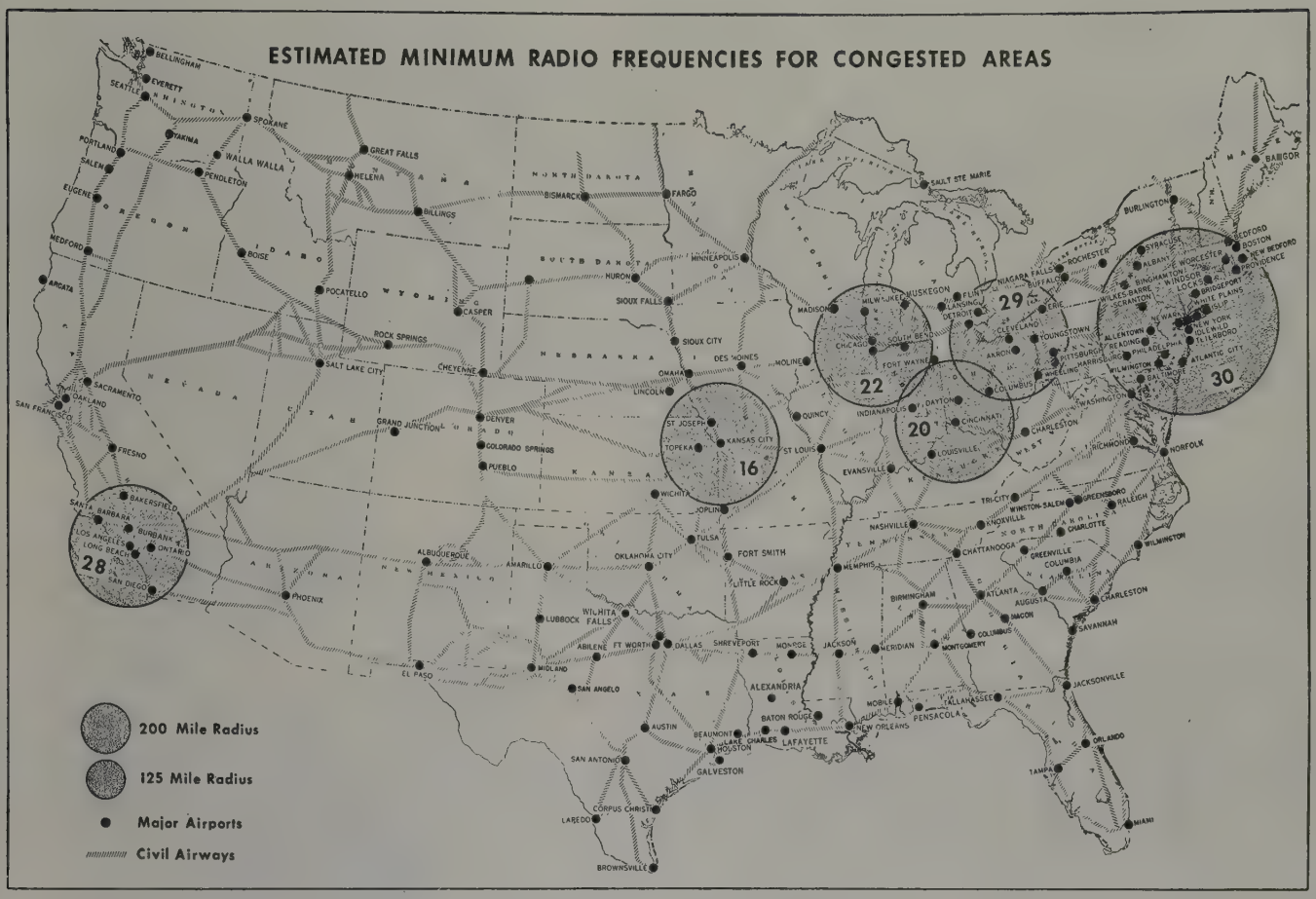
CAA CONTROLLER at LaGuardia selects VHF transmitting frequency to contact pilot to give landing instructions

By N. F. SILSBEE

Exec. Sec., CAOA

In an important study, recently completed by the National Research Council, entitled "*Human Engineering for an Effective Air Navigation and Traffic Control System,*" a number of chief controllers and senior controllers in various Air Route Traffic Control Centers and Airport Traffic Control Towers were interviewed. The object was to find out (1) what were the bottlenecks and what is slowing up the present air traffic control system, and (2) what kinds of equipment are required for use in air traffic control.

Under "bottlenecks," 80 per cent of the replies put "Inadequate radio facilities" as No. 1, and 60 per cent pinned it down further to "Congestion of radio frequencies." Under "equipment desired for communication aids," the largest number of control-



FIGURES within the circles indicate the number of VHF communications channels that will be needed by 1953

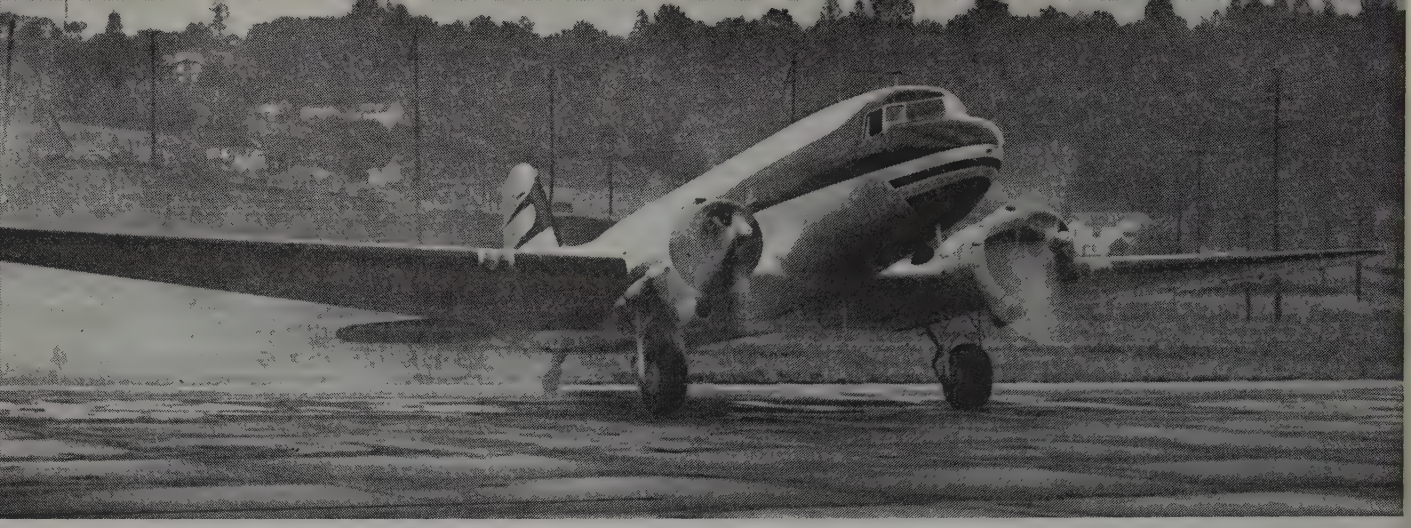
ler-replies stated "More VHF radio channels."

During the past year or two, the larger types of corporation aircraft (such as the DC-3, *Lodestar,* PV-1, A-26, B-23, etc.) have more and more become accepted as "non-carrier transport aircraft," instead of "private planes" as hitherto. Along with the airlines and military aircraft, this group has become one of the most important users of the Federal Airways. As the full transition to VHF for navigation, communications and air traffic control gets under way, it is of the utmost importance that owners and pilots of corporate aircraft understand present and future requirements for VHF radio equipment, and the detailed planning for the transition. This planning includes provision for more—a lot more VHF radio channels. Before coming to the radio problem for larger company planes, a review of the related airline radio developments will be very much in order.

By the late 1930's, the CAA and the airlines, largely as a result of good teamwork on the part of the Air Transport Association (ATA) and Aeronautical Radio, Inc. (ARINC), were well along in their plans to overcome the deficiencies of the low- and medium-frequency radio band for navigation, communication and traffic-control purposes. This included the development of VHF transmitting and receiving equipment and the setting up of several sections of a VHF Visual-Aural Radio two-courses airway (VAR) in the west. However, the war interrupted the wholesale switch to VHF, and the threads were not picked up again until 1945, with the added advantages of important wartime developments.

The original L/MF system required at least one range receiver in the 200 to 400 kc band, and an HF-frequency transmitter. Later developments included the radio compass or automatic direction finder with loop (ADF) in the 100 to 500 kc and 500 to 1500 or 1750 kc band to provide the pilot with heading information along with the four-course range track information. A further refinement was provided by the 75 mc "Z" markers and fan markers to provide accurate fixes for approaches to airports and at intersections of overlapping four-course ranges. Aural signals and, in some sets, a flashing light in addition, are received by this special marker beacon receiver.

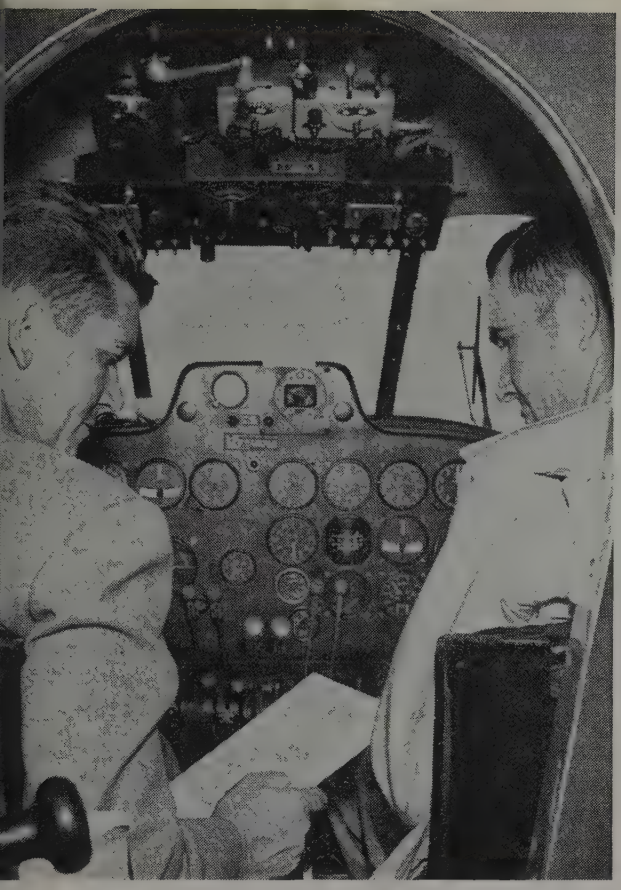
For the postwar switch to VHF, the Air Coordinating Committee, (ACC), Radio Technical Commission for Aeronautics (RTCA), both of which included experts from the Aeronautical Division of the Federal Communications (*Continued on page 46*)



ALLIED STORES DC-3 warms up on the apron at Boeing Field, Seattle, prior to its take-off on flight back to New York

Build Business by Plane

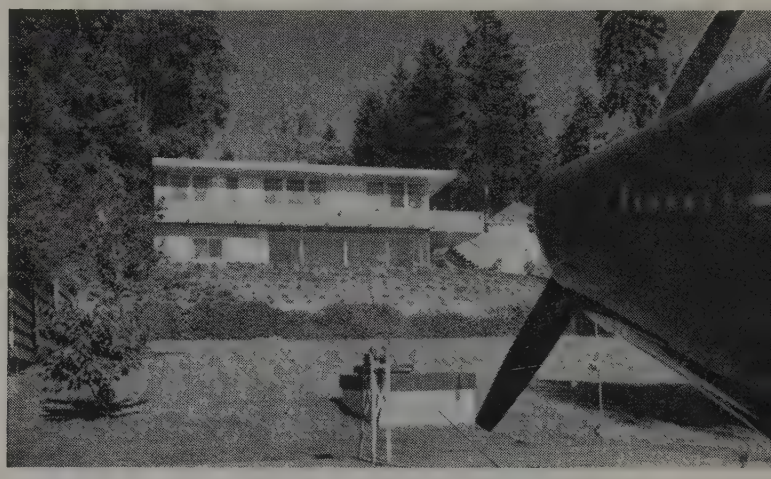
TWIN-BEECH, owned by Rex Allison *(left)*, vice president of Allied Stores, takes on luggage. That's Pilot Hanson on ladder



ALLISON, a licensed pilot *(left)*, often flies the Twin-Beech. Official pilot, however, is Wally Hanson *(right)*

"I COULDN'T do my job without a plane," says Rex L. Allison, vice-president of Allied Stores, one of the world's largest department store corporations, and president of Bon Marche—a department store operating in Seattle, Everett and Northgate, Washington.

The empire which the youthful Mr. Allison supervises includes 29 stores, among them Northgate, the development which is his brainchild and the largest "planned shopping city" now in operation in the United States. All of Allied Stores' establish-

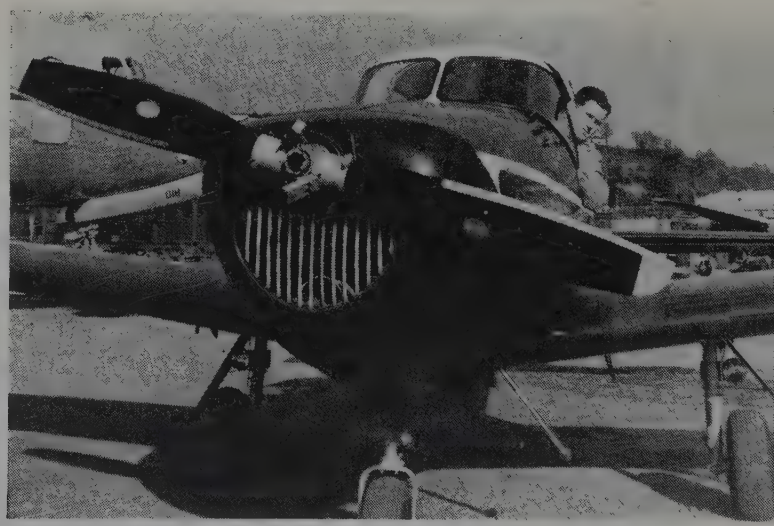


BELLEVUE home of Rex Allison is on Lake Washington, and features a landing ramp for Mr. Allison's Aeronca seaplane

By IRVING PETITE

Corporation executive gives airplane credit for development of new business

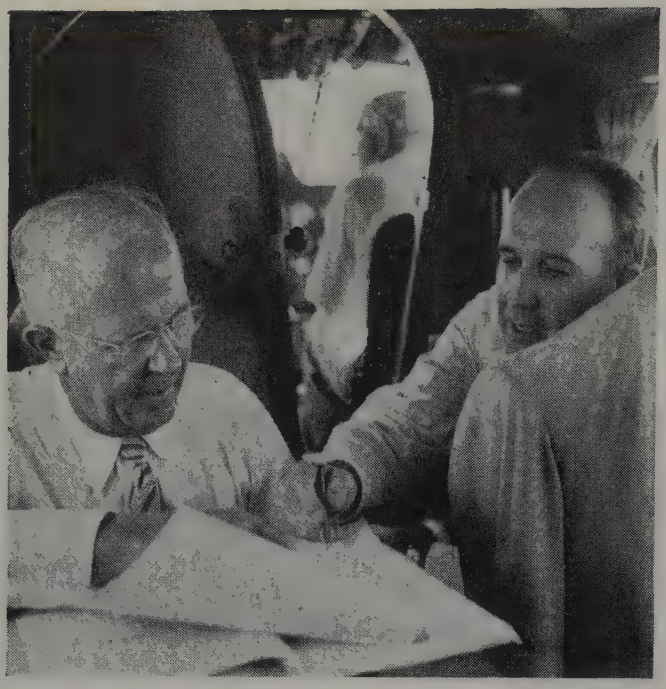
CHAIRMAN OF BOARD for Allied Stores, Earl Puckett, follows Rex Allison out of the company's executive DC-3



NAVION was first plane in the Allison hangar. Rex Allison bought *Navion*, soloed it, then got his license in it

ments in the west are under his command: stores in locales as divergent as Great Falls, Montana, and Pueblo, Colorado . . . in cities separated by vast deserts and plains: Ogden, Utah; Pendleton, Oregon; Mountain Home, Utah.

Allison's means to (*Continued on page 51*)



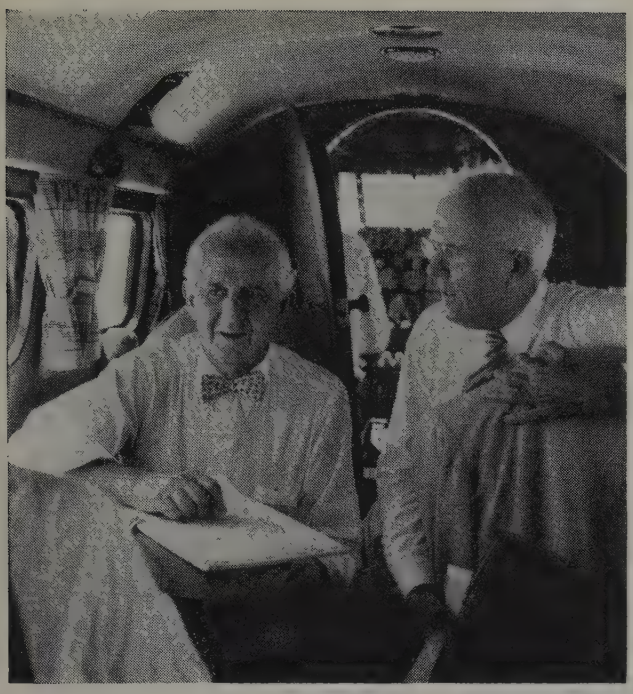
BOARD CHAIRMAN Nichols sits in co-pilots's seat while A. Swanson *(left)* confers in cabin with L. MacNaughton

Executive Pilot

Executive pilot is on the job 'round-the-clock proving his plane's utility

Fred Dick, 40-year-old pilot of the Twin-Beech operated by Southwestern Public Service Company, Dallas, Texas, is typical of the executive flying breed. Since soloing in 1929 at Santa Maria, Calif., Fred has done a little bit of everything to stay in the air, including a stretch at barnstorming. For five years, he was a wartime Lockheed test pilot and was one of the men who put the mighty *Constellation* through its initial paces. He later checked out in a jet fighter. After a brief postwar hitch as pilot for an executive Beech owned by B. F. Goodrich, he met his present employer and has since been squiring the SPSC plane about the country as its full-time commander. There's no clock-punching for Fred—he and his airplane are on call 24 hours a day. When there's not a trip on tap, he devotes much of his time to keeping the plane in perfect trim in the hangar where it is stored at Southwest Airmotive. Of course, major work—like engine overhauls and 100-hour inspections—take it out of service occasionally, but never for very long. To see a front-line member of America's industrial air force in action, let's take a trip with Fred Dick—

PRE-FLIGHT CHECK completed on Southwestern Public Service Company's Twin-Beech, Fred Dick goes to call his passengers



BUSINESS in flight is part of the trip as H. L. Nichols *(center)* talks shop with L. MacNaughton and A. Swanson

SPSC DIRECTOR Nichols holds student pilot's certificate and "could land the Twin-Beech alone," says Pilot Dick

It's 4 PM and the sleek aircraft taxies into position behind a trio of airliners waiting for take-off from Dallas' municipal airport. Although something of an airliner in its own right, tail-end Charlie in the waiting line is dwarfed by the DC-6's and Fred noses the Twin-Beech out of the way of their prop blasts. One by one, the four-engine mammoths climb into the sky, and the SPSC Beech rolls out for take-off. It's twin-finned tail lifts, the nose points for the high white clouds, the landing gear folds against the belly, and it's up and away to the west.

Pilot Dick has launched another Southwestern Public Service business mission in "Reddy Kilowatt," named after the nationally familiar little guy with the lightbulb-nose whose likeness adorns the Beech's riveted side.

Destination is Roswell, New Mexico, 460 miles away. The assignment—to spend the next morning hopping from town-to-town, picking up SPSC directors and getting them safely and quickly back to Dallas before noon for a meeting with Board Chairman H. L. Nichols, and then back to their respective homes before dark of the same day. Dick has made this round many times.

At 9,000 feet, Dick levels off with the practiced easiness of a veteran and settles "Reddy Kilowatt" down to a space-eating 200 mph. He lights a cigarette and holds it in thin, straight lips beneath his clipped mustache as he sets his radio to home-in on Roswell. The Beech's compact, gadget-filled flight deck is a veritable showroom of the latest radio aids to navigation and communication with the ground-bound outside world. As Pilot Dick waggles his wings in salute to a Dallas-destined DC-3, he is quietly pleased to remind himself that "Reddy Kilowatt" is better set up radio-wise than many twin-engine commercial airliners. So he won't be caught with his signals down, Fred has seen to it that his plane has not just one of everything, but two. If one something-or-other goes haywire, there's a standby ready for instant use. As a final precaution, there's also a battery receiver. This $85,000 plane's radio equipment includes duplicate ADF's, VHF transmitter, ILS (including the new omni-directional units), glidepath, marker receivers, and range receivers. Fred is considered expert at using each one.

Among his world-wide circle of friends, Fred Dick is acknowledged to be more than a skilled run-of-the-mill pilot. He is a business-plane missionary who believes in the utility of the big privately owned airliner and who knows that the individual pilot has it within his power, by the way he skippers the ship, either to sell or to unsell the boss on corporate-plane ownership. Thus, he makes certain of the safety and efficiency of "Reddy Kilowatt's" operation. His guard constantly is up against the chances of mechanical failure or dangerous weather which he absolutely avoids. When he flies, he does his best to fly smoothly and comfortably. When he lands, he "greases 'er in." He wants the boys in the "back room" to feel, and to be, as safe and happy as they might be in their own living rooms.

"We have twin-engine airplanes largely because of the safety factor involved," (*Continued on page 48*)

LOVE FIELD RAMP is shown here filled with privately owned planes from every corner of the nation. On one football weekend, Southwest Airmotive served 175 visiting aircraft

SKYWAYS for BUSINESS

News notes for pilots and owners of the 8,000-plus airplanes for business

Executive Pilots' Lounge To be Installed at Newark

Pilots of executive aircraft will be interested to know that plans have been completed by The Babb Company for the installation of an executive pilots' lounge for transient aircraft at The Babb Company headquarters at Newark Airport, N. J.

A marked increase in the number of executive planes coming into Newark Airport has been noticed lately. Newark Airport has modified Calvert markings on runways, and the approach to the instrument runway has a glide angle ratio of 46 to 1. The field also has ILS, GCA, and the latest ALPA approach lights (*see* "A Pilot's Viewpoint," *by W. A. Dixon, December SKYWAYS*). Many transient pilots claim the Newark Airport control tower operators are among the most alert in the country. Landing fee for a Twin-Beech (8500-pound weight) is $2.50. Aircraft parking charge is: 1st 12 hours: No charge; each additional 12 hours or fraction thereof: $1.00. Landing fee for a DC-3 is $4.83; and parking charges are: 1st 12 hours: no charge; each additional 12 hours or fraction thereof: $2.50.

GRUMMAN *Widgeon* is executive plane owned and operated by Sheridan Equipment Company of Leaside, Ontario, Canada. This amphibian is a popular company plane among Canadians

Pilot Group Reports on the New Martin 4-0-4

According to word from Glenn L. Martin Company, their new airliner, the 4-0-4, is not now available for purchase by private owners as executive aircraft. However, this condition may change at any time. With that in mind, pilots of executive planes may be interested in the ALPA (Air Line Pilots Association) Pilot Committee report on the new airplane. Here it is in brief:

A. Flight Handling Characteristics

1. Indication of the stall was clearly announced by buffeting approximately 15 mph before full stall. Control during the stall was good with an approximate 300-foot loss of altitude during recovery to level flight.
2. Stall warning range lessens with gear down and flaps in take-off position. Loss of altitude approximately same as above with good control for recovery.
3. Steep turns at bank angles up to 45° were made with one engine inoperative and the aileron boost "on" and "off." The plane handled well in the turns with boost "on," and with the boost "off" a noticeable build-up of control pressure was in evidence as was expected.
4. TWA pilots with Martin 2-0-2A experience noted definite improvement in landing characteristics. Better elevator control during final stages of approach and touchdown. Smoother landings effected with the new landing gear shock absorber drag-link set-up on this 4-0-4 model than on the 2-0-2A model.
5. Single-engine procedure with one prop used in reverse thrust after landing showed good control of direction with use of nosewheel steering. This was done on dry runway, with reversed prop at 1800 rpm.
6. Ground handling with nosewheel steering and braking main gear: nosewheel steering tends to be touchy; brakes touchy and noisy but normal pressure achieved good braking action.

B. Performance—Emergency Climb, etc. (Simulated engine failure during take-off at V_1 speed)

1. A very rapid acceleration from V_1 to V_2 (a speed of 120 mph) was accomplished with the left engine developing full 2400 hp. It was necessary to haul the ship up in an abrupt manner to maintain the 125 mph best rate of climb. This resulted in a short period of time climb rate of approximately 700 fpm. The stabilized rate of climb, at a speed somewhat greater than best rate of climb speed, was approximately 350 fpm.

   The airplane handled with not too great a control pressure during the climb-out. Several one-engine-inoperative take-offs were made and during one take-off and climb-out, full power was

held for two-and-a-half minutes and an observed indicated altitude of 1180 feet was reached. The average rate of climb for this take-off and climb-out was almost 500 fpm.

C. General Plane Inspection

1. Propeller clearance of 12 inches is on the 4-0-4, representing approximately a two-and-a-half-inch increase over that of earlier model Martin 2-0-2.
2. Main gear is approximately the same as that installed on the 2-0-2A with the exception of the drag-link strut which has a feature of incorporating a shock absorber which lets the main wheels travel aft about seven inches. This makes for an added shock absorber for landings and consequently smoother landings can be made.
3. Inspection revealed that Martin 4-0-4 design indicates that considerable effort for adequate servicing provisions are in evidence.
4. Inspections doors appear to be adequate in number for visual inspection of the highly important areas of the airplane. Heavier fuselage inspection doors, fuselage door and door frame design is in evidence due to the pressurized fuselage feature.
5. Exterior lighting arrangements of the aircraft conform with conventional practice. The only comment the pilot committee had to make was that it was felt a nosewheel strut light that moves with nosewheel steering should be included. This feature may be added at a later date.
6. Martin 4-0-4 features a built-in ramp for deplaning all passengers.
7. Refueling can be done from the bottom side of the wing or from the top side of the wing. The more modern under-wing fueling in the Martin 4-0-4 permits fueling by the service crew without the dangerous maneuvers required for climbing around on the top surface of the slippery wing. The fuel tanks are of the flexible cell type and are considered to be the safest type for carrying fuel by being highly resistant to damage.
8. Emergency exits are up-to-date in design and are adequately marked and placarded for instructions to open them from within the cabin and also on the outside surface of the fuselage.

D. Cockpit Arrangements

1. Instrument Arrangement: Instruments arranged to customer's requests.
2. Radio Control Arrangement: Radio control arranged to customer's requests.
3. Cockpit Lighting: No night flying was performed by Evaluation Committee.
4. Accessibility of Captain's and Co-pilot's Controls, Switches, and Gadgets: No comment from Evaluation Committee except that accessibility of all items requiring attention or action by the Captain or Co-pilot appear to be located favorably and illustrate that considerable study is in evidence for the entire cockpit make-up.

As a whole, there is general agreement in the pilot group that the Martin 4-0-4 shows much improvement in all respects over the Martin 2-0-2 airplane. (*Reprinted courtesy of Air Line Pilots Association*)

. . . in the Corporate Hangar

Herb White and Bill Swift, the boys who sit at the controls of Vincent Astor's *Mallard*, brought the plane into The Babb Company hangar at Newark Airport, N. J., for a routine engine inspection and spark plug change. At the same time the big ship's brakes were worked over and a gas leak was repaired.

The *Lodestar* belonging to Mr. J. V. Lincoln is at the Burbank Base of Lockheed Aircraft Service, Inc., for re-certification inspection.

The Celanese Corporation's *Lodestar* is in the hangar at Southwest Airmotive, Dallas, for some electrical work. Plane was flown from New York to Dallas by Pilot Don Bond.

The Kudner Advertising Agency's DC-3 is in The Babb Company shop for some prop work. Over-seeing the job is Kudner's Chief Pilot R. K. Smith.

Bill Hinton, pilot of Ford Motor Company's *Convair*, flew the plane to Newark for servicing.

New York Wire Cloth Company is having a new radio system installed in its *Lodestar*. The system includes dual Bendix ADF, Bendix NA3 Omni, Bendix air-to-ground telephone, ARC Isolation Amplifier, and a custom control console. Work is being done by Atlantic Aviation Corporation of Teterboro, N. J., and the *Lodestar* was brought into Teterboro by Pilot Stan Smith.

Continental Oil Company's executive B-25, based at Ponca City, Oklahoma, is in the Southwest Airmotive shop for radio work. Pilot Eddie Ross and Co-pilot Ray Scarborough brought the ship in.

Benton & Bowles, Inc., of New York, has had a Narco Omni system installed in its Beech *Bonanza*. Installation was made by Atlantic Aviation. In addition to the *Bonanza*, Benton & Bowles operates a Twin-Beech.

The DC-3 belonging to George M. Brewster & Son, Inc., recently suffered wing-tip damage. The Douglas was brought to Babb Company's Newark hangar for repair and the installation of new tires. Pilot is George M. Bevins; co-pilot is Skip Neely.

Carl Lund, pilot of the International Paper Company *Lodestar*, flew into Southwest Airmotive from the company's Skycraft Division headquarters at Mobile, Alabama, for an engine change.

Goodyear Tire and Rubber Company *Lodestar* was flown to Babb Company shop at Newark for servicing. Pilot Bud Seidner left a spare set of props to be overhauled and stored until needed.

Clayton Kinney, pilot for Miss Belle Baruch, recently took delivery of his Twin-Beech from Atlantic Aviation. The ship was there for engine and prop overhaul and 100-hour airframe inspection.

G. T. McLean and Ted Lawrence, pilot and co-pilot-engineer for Canada Packers, Ltd., of Toronto, Canada, flew their company's Lockheed Model 18 *Lodestar* to N. Y. International Airport for a huddle with Max Helzel of Lockheed Aircraft Service, regarding stripping and resealing of the *Lodestar*.

H. S. Christensen, sales manager of the ARC plant at Boonton, N. J., flew to Southwest Airmotive, Dallas, in the company *Navion* for an engine change and to look after other ARC business in the area. Southwest Airmotive is a major ARC distributor.

Welcome visitor at Southwest Airmotive recently was R. D. Brown, pilot of the Twin-Beech owned by Union Cutlery Co., New York. Mr. Brown had flown company personnel to Dallas on business.

The Grumman *Widgeon* owned by P. M. Pattison, and the Twin-Beech owned by Ralph Rissman of Detroit have been in The Babb Company hangar for reworking. A CAA-required inspection was pulled on the *Widgeon* prior to its being exported. A complete dope and fabric job as well as sheet metal work was done on the Rissman Twin-Beech.

CAOA REPORT . .

CORPORATION AIRCRAFT OWNERS ASSOCIATION, INC.

Corporation Aircraft Owners Association is a non-profit organization designed to promote the aviation interests of the member firms, to protect those interests from discriminating legislation by Federal, State or Municipal agencies, to enable corporation aircraft owners to be represented as a united front in all matters where organized action is necessary to bring about improvements in aircraft equipment and service, and to further the cause of safety and economy of operation. The CAOA headquarters are located at 1025 Connecticut Avenue, Washington 6, D. C.

CAOA and the ACC

The presidential appointment on November 1, 1951, of Donald W. Nyrop to become the chairman of the Air Coordinating Committee brings to this top-level post a good friend of the Corporation Aircraft Owners Association.

While Deputy Administrator of Civil Aeronautics, Mr. Nyrop was the lead-off speaker at the Association's Third Annual Forum in May, 1950. The following October he became Administrator of Civil Aeronautics, and his letter to the CAOA Board of Directors was instrumental in focusing attention on the desirability of transferring the CAOA office from New York to Washington.

In May, 1951, Mr. Nyrop became Chairman of the Civil Aeronautics Board, and in virtue of that office the way was clear for his appointment to the chairmanship of the Air Coordinating Committee when Delos W. Rentzel resigned. Mr. Rentzel, as Under Secretary of Commerce for Transportation, has a national responsibility for all forms of transport.

The Air Coordinating Committee consists in general of the Under Secretaries of the various government departments which have a substantial interest in national and international aviation matters. These include State, Air Force, Navy, Army, Treasury (Coast Guard), Post Office, Commerce (CAA), the CAB, the National Security Resources Board, and Bureau of Budget. Charles O. Cary is Executive Secretary.

The Corporation Aircraft Owners Association is a member of the ACC's Aviation Industry Advisory Panel and takes an active part in the Air Traffic Control & Navigation Panel (ACC/NAV Panel). At the September meeting of the Aviation Industry Advisory Panel, CAOA chairman Cole H. Morrow was asked by Mr. Rentzel to speak to the group on the rapid growth and present problems of corporate aircraft operation.

At Mr. Nyrop's request, copies of the CAOA Directory and Information booklet have been supplied to each member of the Civil Aeronautics Board and to key members of the Air Coordinating Committee.

New Members

The Executive Committee has accepted the applications of two more corporations as regular members of the CAOA. Some details regarding their aviation operations are noted below.

Ford Motor Company, Dearborn, Michigan, operate several multi-engine aircraft of registration numbers in sequence from N 300 K. The Chief Pilot and Manager of Air Transport is E. F. Lundberg (ATR).

Malco Refineries, Inc., of Roswell, New Mexico, is engaged in oil refining, pipe-line production and drilling. The corporation has operated aircraft since 1945 and currently flies a Beechcraft D-18-S. John A. Lyon (ATR) is chief pilot.

Electronic Engine Analyzer

Corporate aircraft operators (especially those with several multi-engine planes) will be interested in Sperry's new portable engine analyzer which electronically detects, locates, and identifies detailed ignition and mechanical troubles in powerplants containing any number of cylinders.

A cathode-ray tube screen on the analyzer shows the co-pilot/mechanic the internal operating condition of the engine while it is running, either on the ground or while airborne. It warns of cylinder and accessory failures such as bad spark plugs, sticking or damaged valves, and pre-ignition before they can become serious.

The engine analyzer now going into production is an improved version of the original Sperry unit, based on extensive field tests and on widespread operational use by Pan American.

The new developments in using this electronic trouble shooter include:

(1) Methods for checking and measuring timing variations in each valve of the engine during flight.

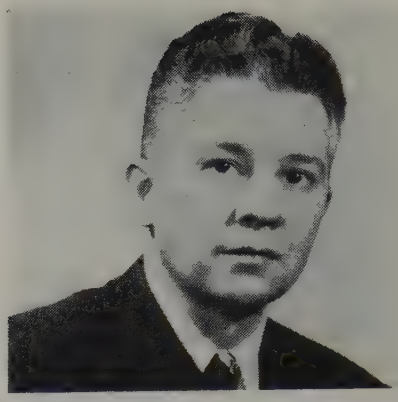
(2) A new timing device which gives a precise indication of the engine crankshaft's position at any instant during its rotation.

(3) A new instrument, called a torque rate pickup, which permits the analyzer to indicate instantaneous variations in the output torque of the engine during flight.

Flight tests on Pan American's Pacific-Alaska Division show that the analyzer, by utilizing a new cruise control technique, can improve fuel economy by five percent. This means not only lower fuel costs but increased payload. On a sizable fleet of aircraft the annual dollar savings could run into five or six figures.

RTCA Assembly

The Radio Technical Commission for Aeronautics is a cooperative association of all U. S. Government-Industry aeronautical telecommunication agencies. It conducts studies in connection with aviation radio communications, navigation, air traffic control and related matters. Its objective is the resolution of such problems by mutual agreement of its member agencies.



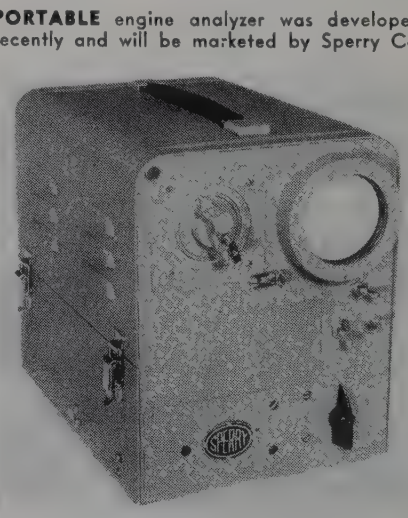
ACC newly appointed chairman is Donald W. Nyrop, Chairman of Civil Aeronautics Board

The RTCA general membership is known as the Assembly, and the administrative body is the Executive Committee. The Corporation Aircraft Owners Association, through its pro-rata contribution to the support of the RTCA Secretariat (headquarters office, publications, etc.), is a member of both bodies, and is currently active on certain Special Committees studying developments of interest to operators of corporate aircraft.

Members of the CAOA are entitled to apply for membership in the RTCA Assembly by writing to L. M. Sherer, Executive Secretary, Radio Technical Commission for Aeronautics, 1724 F Street, N.W., Washington 25, D. C. Membership in the RTCA Assembly includes the right to attend the three-day Technical Sessions each spring and fall and to receive all copies of RTCA papers and reports. A few CAOA members are already members of the RTCA Assembly and several member company pilots have shown considerable interest in some of the recent reports, summaries of which have been prepared and sent out by the CAOA Technical Committee.

At the suggestion of your Executive Secretary, the RTCA is now preparing a list of all technical papers and reports presently available, with a very brief description of each. This list will be sent to all CAOA members as soon as it is ready, and it is expected that many will apply for membership in the RTCA Assembly so as to receive some of these papers and to be placed on the list to receive all such papers and reports in the future.

PORTABLE engine analyzer was developed recently and will be marketed by Sperry Co.



Frontier Guardian

(*Continued from page 11*)

nomical 4,381 hours 30 minutes. One squadron, the 22nd, commanded by Lt. Colonel George H. Crist, notched 1,475 hours 15 minutes of this time.

Again, as in flying time, the same record-smashing performance was repeated in gunnery. Fantastically high scores were recorded throughout the entire group.

As an example, Lt. Jack Furrh of the 23rd Fighter-Bomber Squadron, fired a high single mission of 95.4 per cent. Captain James N. Brink of the same squadron, led all the qualifiers with an over-all average of 47.5 per cent.

Less than five per cent of all the pilots assigned to the entire group were unable to qualify as expert gunners during this test of combat readiness. This in itself was an unheard of performance. To qualify that many men had previously been considered an outstanding feat, but to qualify them as experts was believed beyond the realm of possibility.

These are the kind of records that have made the entire Wing an organization that the whole of the United States Air Force is doffing its collective hats to. But aside from that, the people of Europe have excellent reason to remember the 36th.

Two years ago, Captain Harry Evans, presently Operations Officer of the 22nd Squadron, came up with the idea for an aerobatic team. At the time, the "Acrojets" and "Sabre Dancers" were making headlines in the United States, and Captain Evans saw no reason why this organization should not form a similar team.

He presented his idea and it was met with enthusiasm from all quarters. Thus was born the "Skyblazers," and their fame has grown throughout Europe.

Composed of five men from the 22nd Fighter-Bomber Squadron, the team has shown throughout Europe, England and North Africa, and today no air show in Europe is complete without the 15-minute performance by these men.

In the past two years, it is estimated that the team has performed before crowds well in excess of 7,000,000 people.

Basically, the boys are still merely members of a squadron and they perform their daily mission right along with the other pilots assigned to their organization. But their mission as members of the team has now become that of proving the capabilities of their ship to the peoples of the North Atlantic Treaty nations who are now receiving these ships from the American government.

For example, they recently performed in The Hague, giving a Sunday show that left thousands spellbound. On Monday, the group gave a special command performance for Queen Juliana and Prince Bernhardt. Their most recent show was at Kastrup Airport in Copenhagen before a crowd estimated at well over 30,000 people.

The "Skyblazer" team is composed of Captain Evans, who flies the lead spot; twin brothers, Captains Bill and Buck Pattillo, wing men; Captain Larry Damewood, slot man; and alternate Captain John O'Brien who is capable of filling in at any of the positions.

Captain Evans hails from Heaters, West Virginia, the Pattillos from Atlanta, Georgia, Damewood from Roanoke, Virginia and O'Brien from Pomona, California. All of the men flew combat during World War II.

Only the first three are original members, with both Damewood and O'Brien joining them later. Damewood has been with the team for over a year and O'Brien for about three months.

Their show consists of loops, rolls, split-eights and the other normal acrobatic maneuvers all in a tight formation in which none of the ships ever get more than five feet apart. They cap the performance with a thrilling maneuver which has been dubbed the "bomb burst." All four ships pull up directly over the crowd in a vertical climb, and suddenly separate, each going in a different direction. It can best be likened to peeling a banana. They roar out in four different directions and then come back to cross the field from the four points of the compass a scant 20 or 30 feet off the ground. It never fails to draw roars of delight from the crowd.

Colonel Scott and Colonel Lee took command of their respective organizations in March, 1951. Since that time, the Wing has built a reputation for efficiency and readiness that has seldom if ever before been equalled.

Its been extremely hard work, and both men have spent long hours at their desks and in the air, but it is paying dividends now. The Wing has adopted the motto of "Guardians of the European Frontier." The men are ready to back that motto—in fact, no Wing has ever been better prepared to do exactly that.

Air Aid from Spain?

(*Continued from page 13*)

d'etat that failed some 15 years or so ago.

The Atlantic Pact powers need Spanish air and naval bases; they need a strong and stable Spain as a bulwark in Western defense. But—can they hope to build up the Spanish airplane industry, and with it the Spanish Air Force, sufficiently and quickly enough to vouchsafe the security of Spain, should a full-scale war break out in Europe within the next few years? Has Spain the potential on which to build a modern aircraft industry?

The revolt of Franco's Nationalists in 1936 had little effect on Spanish airplane production for, owing to many years of unstable internal politics, the industry had been reduced to chaos and production was virtually at a standstill anyway. Bombing prevented either side placing aircraft plants in commission during the civil war, but Franco had discovered the value of air power and, as soon as victory was assured, he ordered the reorganization and expansion of the aircraft industry. Airplane production was high on the list of priorities in Spain's reconstruction.

The Spanish aircraft industry was young and inexperienced in the design and manufacture of modern combat airplanes, but with war clouds looming over Europe no time could be wasted in modernizing and expanding Spanish combat squadrons. The international situation prevented the Spanish government from ordering modern warplanes from those powers who did not frown upon the new Spanish regime, these needing all the aircraft that they could build to expand their own squadrons. However, it seemed obvious to Franco that his old ally, Germany, was holding all the Aces in the pack and he deemed it wise to model the reformed *Ejercito del Aire* along the lines of the *Luftwaffe*, equipping it with modern German combat airplanes. Thus, Spain acquired licenses for the manufacture of German bombers, fighters and trainers, and the Nazis supplied the jigs and tooling, the skilled technicians and the production advisers.

The first need of the *Ejercito del Aire* was training planes and orders were placed with the largest of Spain's airplane manufacturers, the *Construcciones Aeronauticas S.A.*, which had plants at Getafe, Seville and Cadiz, for quantities of German-designed elementary and advanced training biplanes. The Cadiz plant received contracts for a total of 175 Bucker Bu-131 *Jungmann* two-seat elementary trainers and Bu-133 *Jungmeister* single-seat advanced trainers, while the Getafe plant started work on an initial order for 25 Gotha Go-145 two-seat trainers.

Orders subsequently followed for 236 Heinkel He-III twin-engined bombers (the Seville plant building the wings and the Getafe plant the fuselages) and one hundred Junkers Ju-52/3m tri-motor troop transports, both of which types were standard *Luftwaffe* equipment at that time. In 1942, a license was obtained to build Me-109 fighters, for which Spanish pilots had formed a liking during the civil war. The version chosen for production in Spain was the Me-109G and a contract for some hundreds of this fighter was awarded to another of Spain's airplane manufacturers, the *Hispano Aviacion S.A.* of Seville.

However, by that time it was becoming increasingly difficult to import airplane engines from Germany. The Spanish *Elizalde S.A.* had already been forced to switch to the production of 750-hp BMW 132 radials for the CASA-built Junkers Ju-52/3m transports, and it was found impossible to obtain any quantities of the DB 605 engine for the Spanish-built Me-109 fighter.

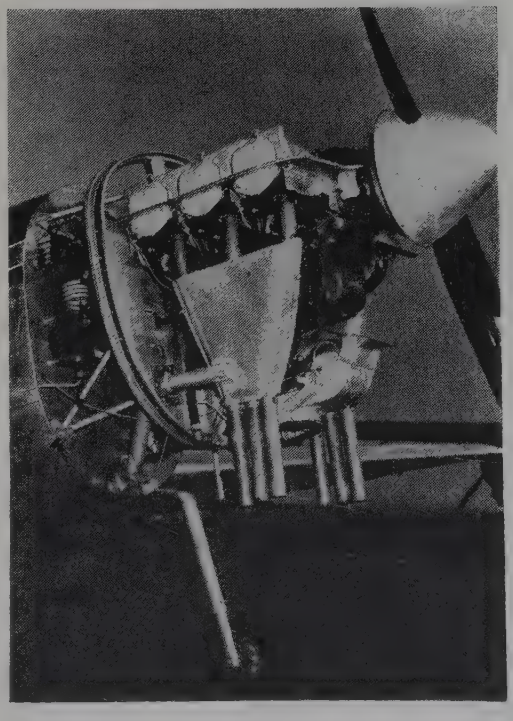
Therefore, *Hispano* were forced to redesign the "109" to take a Spanish-built engine, the Hispano-Suiza 12-Z-89 12-cylinder liquid-cooled geared and supercharged engine of 1300 hp. Propellers were imported from the Swiss *Escher-Wyss* plant. The Spanish-built fighter was redesignated Hispano 109J and the most obvious change from the German model was to be seen in the nose contours caused by the replacement of the inverted Vee DB 605 motor by the upright Vee Hispano-Suiza. Armament of the H.S. 109J was increased to three 20-mm cannon, maximum speed was 405 mph at 13,780 feet and the fighter climbed to 6,560 feet in 1 minute 42 seconds.

Thus, by the end of the war in Europe, the entire equipment of Spanish squadrons was nationally built but of German origin, and it is these airplanes that form its sole equipment today! Such antiquated combat airplanes are about as much use in defending Spain as would be Wright biplanes, and the reason for Franco's anxiety to acquire modern American jet fighters is only too plain.

The Spanish airplane industry's previous sources of technical guidance, Germany and Italy, can no longer help her and she does not possess either the know-how or the research facilities with which to embark upon her own program of jet research and development. Thus, since the end of the war Spanish plants have been forced to confine themselves to the design and manufacture of military and civil trainers, transports and light airplanes, but these aircraft show very con-

DE HAVILLAND CHIPMUNK, a Canadian-built primary trainer, presently is being tested with a Lycoming O-435 engine. Standard powerplant is a DH *Gipsy Major*

Lycoming-Powered Chipmunk



There's a new look to the de Havilland *Chipmunk* these days. One of the trainers is being tested with an American built Lycoming O-435 engine. Its original powerplant was a de Havilland *Gipsy Major* engine of 140 hp. The Lycoming O-435 offers 190 hp at 2,550 rpm. Installation of the Lycoming engine necessitated redesigning the *Chipmunk's* engine cowling. New cowling is two-piece. Note the extra long exhaust stacks. The cowling is quickly removable, being held in place by only four fasteners. It uses "Met-l-prop."

INSTALLATION of Lycoming O-435 engine required new cowling design. Note the extra long exhaust stacks. Standard Met-l-prop is used

siderable promise. Their performances and finish are excellent and they serve to give some indication of what the Spanish aircraft industry *will* be able to do with the United States assistance.

The most recent airplane type to be adopted by Spanish squadrons is the Hispano HA-43-B1 two-seat advanced trainer developed from the AH-42-B produced in limited quantities for Spain's Air Force during 1947-49. The HA-43-B1 differs from the earlier trainer in having a fully retractable tailwheel undercarriage. Power is provided by a 390-hp Armstrong Siddeley *Cheetah* 27 radical, and the pupil and instructor are seated in tandem under a sliding canopy. Of mixed construction, the HA-43 has a maximum speed of 208 mph, a cruising speed of 183 mph, and an initial rate of climb of 1,410 feet per minute.

The *Construcciones Aeronauticas S.A.* has built a new plant recently at Madrid which is engaged in the construction and development of a series of twin-engined feederliners designed by Don P. Huarte Mendicoa. Designed specifically to fly on the internal air routes which connect 15 Spanish cities, the first of these light transports is the CASA 201 *Alcotan* which seats 10 or 12 passengers and carries a crew of two over a range of 621 miles at 180 mph. As a freighter it can carry 2200 pounds over the same range, and a maximum load of 4,000 pounds over shorter ranges. The *Alcotans* so far built have been powered by 380-hp *Cheetah* 27 radials, but tests are being conducted with a version powered by two nationally designed 450-hp Elizalde Sirio radials; these are expected to increase the cruising speed by 10 mph. The *Ejercito del Aire* is evincing much interest in the *Alcotan* and military crew training versions are being developed.

A development of the *Alcotan* now under construction at Madrid is the CASA 202 *Halcon* which carries 15 passengers and a crew of three. The *Halcon* is to be powered by two 750-hp Elizalde radials and estimated performance figures include a cruising speed of 186 mph and a ceiling of 24,770 feet.

The most recent Spanish lightplane is the I-11, produced by the *Iberavia S.A.*, which had previously concentrated on the design of gliders intended to serve as trainers for future pilots of the Spanish airborne units. Of clean design and strongly reminiscent of the All American *Ensign* of some years back, the Iberavia I-11 is a side-by-side two-seater with a fixed nosewheel undercarriage. Maximum speed is 122 mph, cruising speed is 108 mph, and range is 478 miles.

The most prolific of Spain's lightplane constructors is the *Aeronautica Industrial S.A.* of Madrid which has built a series of light trainers and touring aircraft during the past 10 years. These have been designed by Don P. Hauarte Mendicoa (who is responsible for the *Alcotan* and *Halcon* transports) and many of them have been supplied in quantity to Air Force training squadrons.

Spain has some thousands of skilled airplane workers, she has a number of modern aircraft plants, the nucleus of a strong air force and large numbers of excellent military pilots. Most of all, she has strategically useful air and naval bases. There is the possibility that we may be attacked by the strongest military forces ever assembled by one power and at such times we cannot afford to be too choosy as to who fights on our side. Necessity makes strange bedfellows.

CREW CHIEF S/Sgt Bruno Palionis makes final check of the form of an F-94 All-Weather jet, which is ready at all times to take to the air against enemy planes approaching U.S.

East Coast Alert

(*Continued from page 25*)

C. Sadek of St. Paul, Minnesota, a flight leader of the 33rd:

"Our job is to work with information given to us by the ground radar people, get our own flying radar operator up where he can pick up the target, then deliver the firepower to knock out the other plane. We aren't experimenting with these planes. Every day is a big day for us. It's business. When we aren't tracking unidentified planes and that means all of them—airliners off course and others following their flight plans—we're practicing landings on instruments or with the Ground Control Approach crews talking us right down to the runway."

As he talked, Captain Sadek briefed the next crew to go on alert, standard operating procedure for the outfit.

"There's no seat-of-the-pants flying anymore. We have to think right and to do that means practice. So, we keep shooting each other in the arm. That's why every time a pilot goes up, no matter how often, we brief him. Then we stay careful. You may think wrong once and get away with it. Next time you're dead."

This attitude has been firmly entrenched in every one of the pilots by their energetic base commander, Colonel Harrison Thyng, one of the world's leading fighter aces. Colonel Thyng, drawing from more than 3600 flying hours logged in fighters and 182 combat missions in World War II, understands intimately the knotty problems faced in this operation.

Besides standard procedures, Colonel Thyng has brought in innovations which have paid off handsomely in safety and in better flying.

One of these is a mobile ground-control unit, manned daily by a duty officer of at least flight leader calibre. The officer, parked at the end of the duty runway in his radio-equipped trailer, grades all landings as "rough," "satisfactory," or "excellent." At first, some of the pilots resented what they termed grade-school tactics, but quickly changed their tune when they saw the idea paying off in improved flying technique as each pilot strove to better his mark.

Another policy which has paid dividends is the compiling of a weekly aetivity report on all other comparable outfits in the United States so pilots of the 33rd can judge their own operation with those of unknown buddies facing a similar situation.

Another of the crack fighter pilots of the unit is Lt. Col. W. Millikan, commanding officer of the 33rd Wing. Millikan commanded the 121st Fighter Squadron at Andrews Air Force Base, Maryland, a national guard outfit recalled to active duty in February, 1951, before he joined the 33rd in May.

The 32-year-old jet pilot flew for the RAF in England in 1941 and '42, after which he transferred to the Army Air Forces, staying in England with the Fourth Fighter Group until his wing man collided with him near Berlin in May, 1944. He was taken prisoner and remained in a POW camp nearly a year until he escaped and joined units of Gen. George Patton's Third Army, then smashing its way into the Reich.

Colonel Millikan stressed the importance of having different types of aircraft in one outfit. "It calls for a lot of added responsibility, but it allows us to do all the jobs needed," he explained.

Along with experience gathered in World War II, more and more vital information on the latest methods of jet warfare is being brought into the outfit by veteran airmen of the Korean war, rotated to utilize their training in the protection of the American homeland. More than one-third of the personnel of pilots have seen extensive action in Korea, where they tangled with the latest types of jet fighters put up by the enemy. In fact, so many of the group saw action in the Far East, a typical ready-room bull session sounds like a travelog review of Korea and Japan.

These, then, are the men who are charged with the protection of our Northeast Coast. Stretching north into the New England industrial region, and south to the great, sprawling metropolis of New York, they patrol the skies up to altitudes where even their sleek, deadly jets gasp for air.

They are the shadowboxers of the clouds who are ready when the bell rings—poised to block the blow that could knock out millions of fellow Americans in the first round.

Bold Pilots Do Grow Old

(*Continued from page 15*)

like a spring and flip you merrily back into the air.

Carry about 1500 rpm on your let-down—1500 won't hold you up, but neither will it drop you in. Come down your final approach path with the nose in slow-cruise position—slightly elevated. You are about half way between a three-point full-stall attitude and the nose-down high-cruise position. Now hold that position and let the airplane settle. Just keep on flying along, settling, not rushing things, holding the nose position and the 1500 rpm. The runway comes up smoothly and gradually. It's a low-pressure maneuver. Finally the wheels touch. *At the precise instant they touch,* relax the back pressure on the stick and briskly and deftly give it a little forward pressure. This deft small shift in pressure on the stick is the only real knack in making a wheel landing. If you are late with it, the airplane will hit on its wheels and bounce into ballooning flight. Once you have bounced, the whole deal is off. If you give forward stick *then,* you come back down too abruptly, bounce again, and you are in the old familiar crow-hop. You are out of phase with the sequence of events. Don't be alarmed by the crow-hop. You'll have a number of them before you master the wheel landing. They are not dangerous.

When you do get into a crow-hop, it's best to add power, get the airplane flying again, and then start in all over again with your 1500 rpm, slow-cruise let-down. On a short field, of course, you would simply go around again. It's best to practice the wheel landing on a long hard-surfaced runway until you get proficient, mainly because you can louse up one and still have enough runway left to correct things and make another.

Some people are afraid to give the airplane forward stick when they touch for fear of nosing over. This fear is fostered by the habit, already formed, of hauling the stick clear back into the midriff on the normal three-point landing. However, your chances of nosing over are remote unless you ram the stick right up against the panel and hold it there. Wolfegang Langeweische, one of the best lightplane flyers and writers says: "Plaster it on." He means, give it plenty of forward stick. I don't quite agree with this doctrine, but it does show that you *can* give it a good positive forward stick and still be safe.

It is best to start your wheel-landing practice against a head-on 15-mile wind. The wind holds your ground speed to a minimum, softens any clumsy bumps due to improper let-downs and, finally, it approximates the conditions when you actually have to make a wheel landing. In a really high wind, a wheel landing should be carefully planned while you are still in the air. Never mind the inviting stretch of 4,000-foot concrete runway then, unless it brings you safely and directly up behind some natural windbreak such as a hangar, clump of trees, thick hedgerow or whatever. Look the field over. You don't need much room for your landing because the wind will make your ground speed virtually zero. If there's a reasonably smooth sod strip that's about 500 feet long—with a natural windbreak at the end of it—wheel in on that small strip, keep it on the wheels, and taxi to sanctuary before you let the tail drop. Try a wheel landing of this type in a 30-mile breeze at your home airport as a sort of graduation exercise after you feel you are really sharp at this important maneuver. Once you've done that, you'll never start worrying about winds springing up unexpectedly while you are aloft, because you'll know you can handle them!

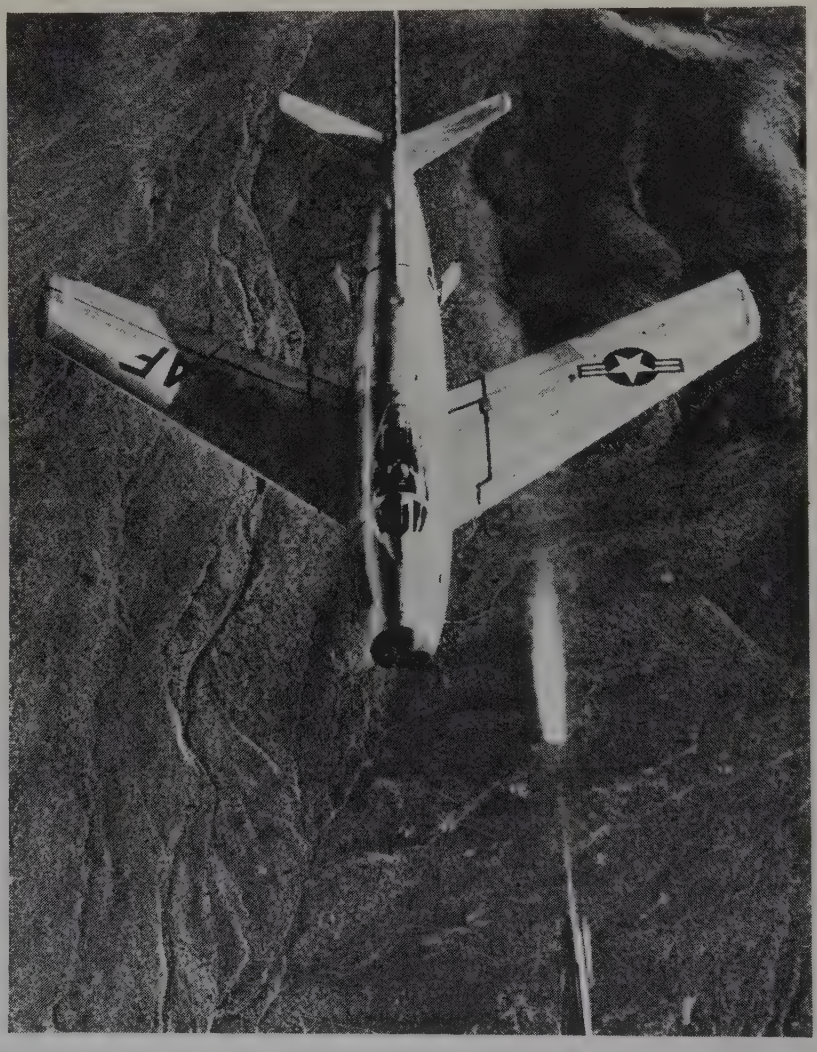
Of course, there may be a time when you must land in a high wind at an airport without any natural windbreak. Don't rush it down just because you are scared and want to feel the ground under your wheels. You are safe enough in the air if you fly at moderate speed, even if the gusts make you uncomfortable. Circle the field at low altitude until the guys in the hangar come out to see what's going on, then waggle your wings at them until they get the idea that you want help. They are air-minded. They'll get out alongside the runway, sooner or later, ready to grab your wing tips. Bring the airplane in with plenty of power, wheel it on before you reach your line of helpers, and keep it on the wheels until they definitely have a grip on the wings. If you misjudge your first try, take the plane around. Give the men on the ground an easy shot at your wings or they'll probably not get hold of you at all!

If the worst happens and you have to taxi crosswind without help, move just as *slowly* as you can. Hold the stick in the direction the wind is coming from. If you are taxiing down wind, hold forward stick to keep the tail down.

Now to crosswind landings.

Personally, I found them difficult because I was told that "you have to slip the airplane onto the ground." To me, a slip has always meant a sudden abrupt loss of altitude. I feared that there would be an enormous bounce if I "slipped it onto the ground." My reflexes, I knew, were pretty good, but they weren't that good. So I built up a real doubt in my mind that I would ever make a good crosswind landing.

It wasn't until I did a lot of practicing that I found you don't really slip your anxious airplane onto the ground. You fly it on, slipping in a positive, very gradual manner.



AIR FORCE SABRE carries rockets for attack against the enemy. In this photo a white-hot burst of flame marks the trail of high-explosive rocket fired from F-86 *Sabre* during training operations over the Nevada desert gunnery range at Nellis Air Force Base. Note the F-86's dive brakes in open position in this photo

There is a tremendous difference—believe me.

Here is the recipe:

As you come down on your final approach, the wind makes your plane drift. So you bank slightly into the wind—or you bank considerably—until you see the drift stop. Then, in the same instant, you press opposite rudder to keep the plane from *turning* into the wind. You apply just enough rudder to hold your heading. This is no violent altitude-losing slip. It is what you would call sloppy flying if you had no wind, nothing more than a gentle application of crossed controls.

Try it first as you fly along in level flight over a runway. Simply use it to hold your heading. Then, when you get familiar with it, reduce power and use it for the landing. At the last instant, neutralize your controls, wheel the plane on, pop your stick forward gently, and you've got it made. Go up with a good instructor for your first sessions of crosswind landings. It is possible to get into trouble on this maneuver until you get proficient, and it's wise to have somebody along who can bail you out if you get rattled and pull a real Dilbert. However, the instructor won't be with you forever, so start making your own as soon as you feel able. Start with mild 5- to 7-mile cross breezes and gradually move up until you can bring it in with a 20- to 25-mile wind blowing right on your elbow.

There is, of course, another way to make a crosswind landing. It is simpler than the one just described and many pilots prefer it. Instead of slipping, you crab into the wind on final, just as you crab into it to hold a heading on cross-country. In other words, you point the airplane's nose at an angle to the runway as you let down, and at the last instant you kick it around straight, and land. One tip that may help you on this is to land at a slight angle across the runway—if the runway is a wide concrete one—instead of straight down. This gives you a chance to land maybe 10° closer to the direction from which the wind is coming, and can be definitely helpful if executed properly.

Finally, let's take the short-field or "field-carrier" landing. In this one you come in close to stalling, carrying power all the way and in a definitely nose-high position. You "drag it in over the fence" as they say. It's tricky, especially in gusty air, and when you do chop the gun you want to get the stick forward right now because the plane may stall out. But you'll be amazed at how short you can land with this gimmick, once you've mastered it.

I practiced my field-carrier landings first at 3500 feet in my Mooney *Mite*. I put the wheels and flaps down and experimented with slow flight. I found I could keep on flying in a mushy sloppy manner at 40 mph with 1500 rpm. I added 10 miles to that 40, just to be on the safe side, and did screwy things with the stick and rudders to see if I would get a stall or spin at 50 with 1500 rpm. I yanked back quickly on the stick. The nose came 'way up to where I couldn't see the horizon, and yet the plane didn't stall, so I knew I wouldn't kill myself with a sudden inadvertant yank on the stick down low. Then I banked abruptly at a very steep angle, holding back stick. The Mooney took it without spinning. So I knew I could get away with an emergency turn down low at 50 mph and 1500. In other words, I knew what I could get away with before I ever got down in the danger zone.

Then I came down to the field and did some more experimenting. I knew that surface gusts and gradient winds can foul up maneuvers that work like a charm up high, and I wasn't taking any chances. I used 1600 rpm and 60 mph and did some landings that way. Then I tried 1550 and 55 miles. Finally I used 1500 and 50 miles, and brother that Mooney really squatted! I had her dead stopped in 250 feet with practically no wind, and the brakes on the Mooney aren't exactly built to halt an express train. Now as a routine thing, I use 1550 and 55 on my field carriers, and I can get into any field that anybody else can get into. I always fly on the conservative side. No use cutting it too fine, even though I'm pretty sure that 1500 and 50 will work in all cases.

I would recommend that you do something of the same kind of practicing when you get started on slow-speed power landings. Take the time to find out just what your ship will do in slow flight, up high, where you can't get hurt. Then, when you do get down low, don't try to squeeze the ultimate in slow-speed out of the airplane. Give it a break and it will take care of you. Ride it too close to the line and it may give you a bad time. Remember, in gusty air, add 10 miles—or more if the gusts are really severe!

Now let's consider some of the other cross-country hazards that you can expose yourself to around your home airport. One is thick haze. I used to get a case of big and little jitters when haze set in. So last summer I set out deliberately to break my fear of haze. I'd go out to the airport and take off when haze hung heavy. At 1500 feet the hangars would look gray and remote, and at 3,000 I had the eerie, unpleasant sensation of being out of touch with the ground, even though I could see it dimly through the mirk. I wanted to come down and land and the heck with it. But I didn't. I kept circling up there, keeping track of other aircraft (you certainly can't practice in haze except legally, when it's above CAA minimums!), watching the ground, just getting toughened up to flying in haze. I've stayed up there a half hour to an hour at a time.

Human beings are peculiarly made. They can't keep on being afraid of something after they've exposed themselves to it long enough. I found that haze was that way. Pretty soon I was taking off down the highway, going 10 miles away through the haze, and coming back. Finally, I gave myself the graduation exercise. I flew from Morristown, New Jersey, to Teterboro, which is right on New York's doorstep, over the highly industrialized Jersey flats. That's really a haze run. Even the birds carry winglights when haze and smog hangs heavy over Teterboro.

Since then I have commuted by air some 35 times from central Jersey into Teterboro, morning and evening, when haze is worst. One time I came in when the haze was so bad the tower didn't see me until I was 50 feet above the runway on final. They blistered me, and rightly so! I had one-way radio only, and had to call them from my

(*Continued on page 54*)

AUSTER AIGLET is new English side-by-side elementary trainer. One feature is clipped wing which gives higher rate of roll. Its top speed is 132 mph

Rip Tide in the Sky

(Continued from page 18)

Nearly all of the past year was spent in accurately calibrating the rate of sink of the two gliders. Many flights were made in still air off shore near Seal Beach to obtain this data. The first flights tracked by radar showed that the Pratt-Read gliders, built mostly of wood, presented a very poor radar target. After considerable trial-and-error research, the cockpits were lined with tin foil to make a better radar target.

The Sierra Wave usually operates from the middle of September to the first of June. There is an occasional condition during the summer that causes similar vertical currents. but with nowhere near the frequency found in the winter months. The wave will occur from 30 to 40 times during a winter, sometimes as often as twice a week.

Pilots planning flights in the wave keep a close watch on the San Francisco weather. When a strong cold front passes eastward from the coast, the stage is set for the wave to work. Technically, the wave is formed by a "katabatic wind" (destructive) and was first spotted in the Bavarian Alps after World War I. Because of the shape of the clouds, the German dubbed this condition a "Moatzgotl," meaning "foe's beard."

Of secondary but definite importance is the study of altimeter error near high ridges. The difference between true and indicated altitude, always on the low side, presents a very plausible answer to the transport crashes that have occurred "just a few feet below the crest of a ridge" where extremely competent pilots made macabre headlines.

The peak of White Mountain just northeast of Bishop has been measured by the U. S. Coast and Geodetic Survey as 14,242 feet. During one of his survey flights for rain making, Bob Symons had Elvin C. Pye, who was in charge of the U. S. Weather Bureau station on the Bishop Airport, riding as an observer in the nose of his P-38. Conditions were right and the wave was working when they flew by below the top of the peak of White Mountain. Both altimeters in the war-surplus P-38 read 16,000 feet—yet to top of the peak was sticking up into the clouds! Suspecting an instrument error, Symons had both altimeters bench checked and found them to be completely accurate.

Conditions similar to the Sierra Wave can be found downwind of nearly every large ridge. Denver, for instance, in the lee of the towering Rocky Mountains, is ideally situated to develop wave conditions. Quite frequently airline schedules are disrupted westbound out of Denver because of the inability of airliners to climb up through the turbulence and down drafts of the "wave" effect.

One United Airlines' pilot reported seeing four or five standing waves near Denver after take-off. The down drafts were so extreme that he headed south toward Albuquerque, but the air became so turbulent that he slowed the speed on his DC-4 to 150 mph and dropped the gear and flaps to keep slowed down. With the power throttled all the way back, this unpressurized DC-4 climbed from an indicated 9,000 feet to 17,500 even though the gear and flaps remained down.

Harlan Ross, who went to 35,100 with 60-year-old George Deibert, Bishop Airport Manager, as a passenger in a surplus TG-3 sailplane, reported soaring his Piper *Clipper* in a "wave" condition over Pike's Peak near Denver.

Bob Symons has been more or less "father" of the Wave research for the past 20-odd years that he has flown in the Bishop area. In his spare time, Bob is building a pressurized sailplane to use for really high-altitude research flying. He has welded a large belly tank into a sealed cabin for his Pratt-Read sailplane. He hopes to soar to 70,000 feet or even higher in this "pressure cooker."

Heating and cooling present many problems in this very-high-altitude research. Symons plans to use the simplest form of heating—solar radiation. At high altitudes, the sun's rays are very powerful because they do not have to penetrate the haze common at lower levels. Symons plans to paint his "pressure cooker" black on top to absorb heat which will radiate inside the cockpit. Just in case this system is too efficient and it gets too hot in the cockpit, he is building a silver-painted curtain into the top of this belly tank which he'll use to reflect some of the heat back outward if it gets too hot.

Symons plans to pressurize this belly tank at 30,000 feet. He will pre-test the unit at 10 pounds per square foot at —100° F by packing the unit with dry ice. A bellows system will seal the push-pull controls for rudder, elevator, aileron and spoilers.

"At 35,000 feet and up, the temperature is about —55° C or —67° F," explains Dr. Harry F. Adler, director of the Medical Sciences Division of the USAF School of Aviation Medicine at Randolph Field. "Electrically heated suits can maintain a person comfortably at the above temperatures. If the suit fails to function, some protection will still be afforded for 15 to 45 minutes. However, fingers, toes and face especially will develop severe frostbite in just a few minutes at that temperature if gloves, etc., are lost. There will be little or no warning before the fingers will be as stiff as 'meat out of deep freeze.' Obviously, at these temperatures anyone will lose his body heat at a terrific rate and will be unable to move, much like snakes that get too cold.

"At about 58,000 feet, the lungs would be filled with only water vapor and carbon dioxide (no oxygen). Water vapor at body temperature has a vapor tension of 47 mm of Hg. It would begin to 'boil' in the tissues, lungs, etc., at about 65,000 feet where the total barometric pressure is 47 mm of Hg.

"Using ordinary oxygen apparatus (demand system or continuous flow), altitudes of 38 to 40,000 feet are feasible.

"Using a pressure breather, altitudes of 43 to 45,000 feet are feasible, depending upon the apparatus and the training of the individual. With pressure suits, altitudes higher than 50,000 feet are attainable.

"With pressure cabins, there's no limit to the altitude—it depends upon engineering design. A 'space ship' can go anywhere. . . . These days everybody is afraid to say something can't be done or that problems are insurmountable. Today's 'dreamer' becomes tomorrow's authority on 'how he did it'."

Close study of an aerodynamic slide rule comes up with the interesting idea that a present-day sailplane could conceivably go higher than any present day jet fighter, excluding the rocket-powered X-1 and its contemporaries. Current fighter aircraft will stall out at altitudes not too far above 50,000 feet. Take a hypothetical flight to 100,000 feet. An average glider with a wing loading of 4½ pounds per square foot cruises at about 50 mph and sinks at a rate of 3½ feet per second to hold a glide ratio of 20.1. At 100,000 feet, the actual airspeed would be 415 mph although the ship would still be indicating only 50 mph. The rate of sink would be 30 feet per second (no problem for the "wave") and the plane would be flying at Mach .67.

Because of the high wing loading of present-day fighters—60 to 80 pounds per square foot—it is not at all out of line to suppose that a rugged glider, capable of withstanding 10 G's, could fly higher than anything but a rocket-powered research craft.

Since lenticular clouds have been accurately measured in Sweden at 70,000 to 90,000 feet—and it takes strong up drafts to make them form—the potential of wave flying seems almost limitless.

If pilot Bob Symons can actually finish this "pressure cooker" and turn in any record flights, he will have surmounted a great many problems. In addition to the items mentioned by Dr. Adler, Symons has

the added handicap of flying with only one foot. He lost the other in a farm accident and began his flying career in gliders only because he could not obtain a waiver on his physical exam to fly powered planes. While attending Junior College in Riverside, California, he joined the Riverside Aero Club and helped build a glider. Another member of this same club was the late Indianapolis racing driver, Rex Mays.

Returning to Bishop, Symons bought a Bowlus kit, built the glider and taught himself to fly it. After 600 hours flying gliders, part of the time as a flight commander at the Wickenberg, Arizona, USAF training school, he was able to get a private powerplane license.

After World War II, he went back to Bishop and continued to fly. "Everyone thought I was a screwball," said Symons. "I was always fooling around with something. Perhaps that's why I began rain making."

When he isn't busy flying scenic hops, ambulance runs, making aerial photos or flying forest-fire patrol, he may have time to put in a little work on his "pressure cooker."

A self-taught meteorologist, Symons is an acknowledged expert on the Sierra Wave. He is acting as glider pilot, tow-plane pilot, consulting meteorologist, and is furnishing some of the equipment on the current "wave" project.

While the current winter wave project does not compare in size or scope with the recent Florida thunderstorm project, the results obtained from this study may well make as important contributions to safety in flight.

When it comes to wild and wonderful flying, the high lenticular clouds bouncing downwind off mountain ridges act as a signboard. To a pilot flying his first hop in mountainous country, it may well be called a rip tide in the sky. With general circulation of the results of the current Sierra Wave Project, a pilot will merely detour around the worst of this localized weather and pick up a free lifting ride from the currents going his way.

Who said there wasn't anything new under the sun?

Floating Air Bases . . .

(*Continued from page 21*)

water ice, although similar to glacial ice in character.

When pilots flew close to its apparently washboard terrain, they found that the island was actually quite flat—the rolling ridges were only inches high. Pilots believed they could have landed on this Arctic ice island with wheels or skis without any difficulty whatsoever.

The discovery of this floating ice island recalled to the minds of air force strategists one of the most fantastic projects of World War II. British and Canadian scientists had experimented with an ice compound made of wood pulp and sea water—named "Pykrete" after its inventor, Geoffrey Pyke—which could withstand heavy bombing and torpedoing and would not readily melt. When the Battle of the Atlantic looked darkest, they proposed that the Allies construct a self-propelled airfield of Pykrete, float it to a strategic spot in the North Atlantic and use it as a base of operations against German submarines. "Project Habakkuk," as it was called,* had the enthusiastic endorsement of Winston Churchill.

When the U-boat menace was brought under control by other means, Churchill argued strenuously at the Quebec Conference in 1943 that ice islands be used against Japan. But the U. S. Chiefs of Staff were cold to the idea, and it was dropped. At their most grandiose, however, Habakkuk fields would never have been more than insignificant slivers in size as compared to this magnificent chunk of natural ice found in the Arctic in '46.

While higher-ups pondered the question of what to do about this wandering Arctic island—first designated as "Target X," later "T-1"—the Air Force's 58th Strategic Reconnaissance Squadron was assigned the job of keeping track of it. The primary mission of the 58th, stationed at Eielson Field near Fairbanks, was to fly the famous "Ptarmigan" weather hops to the North Pole every other day in stripped-down B-29's. By altering their courses so as to fly across the last-reported position of T-1, the "Pole Vaulters" managed to keep track of it for three years. During that time it had traveled 1500 miles, following the current of the Beaufort Eddy, a gigantic, slow-moving whirlpool that flows eastward across the Pole, then back west along the top of the North American continent. But in October, 1949, they lost T-1 somewhere north of Greenland.

Meanwhile, debate was raging as to where the gigantic slab of fresh-water ice could have come from. Snowfall was suggested—masses stacked on top of pack ice. This possibility was abandoned, since the annual average precipitation in the Arctic is only 20 inches. Could it be part of a glacier that had come down off an Arctic mountainside? Scientists who had been with Admiral Byrd pointed out that similar huge ice slabs broke off from the glacial Ross Ice Shelf in the Antarctic every year and drifted north into warm water, where they melted. But unlike the Antarctic, the land surrounding the Arctic Ocean is relatively flat; there were no known glaciers on the Arctic coasts of Europe, Asia or America large enough to have produced anything as big as T-1. Some scientists offered the theory that the island was a fossil remnant that had somehow survived from the glacier that covered the northern hemisphere during the great Ice Age 15,000 years ago.

Three of the people most interested in the ice island began tracking down the mystery on their own. They were the young skipper of the 58th Reconnaissance Squadron, Lt. Col. Joseph O. Fletcher; his wife, Caroline, a Wellesley graduate; and the squadron meteorologist, Captain Lawrence S. Koenig, who became so captivated by T-1 that he earned the nickname "Ice Cube." Among them they read every book and report about the Arctic they could lay hands on, including several reports translated from Russian. They discovered two clues: in 1906 Admiral Robert Peary had reported huge glacial formations on the coast of Ellesmere Island, close to the North Pole; and in 1947 a joint U. S.-Canadian expedition had noted—and photographed—a fresh-water ice formation in the sea off the coast of the same island.

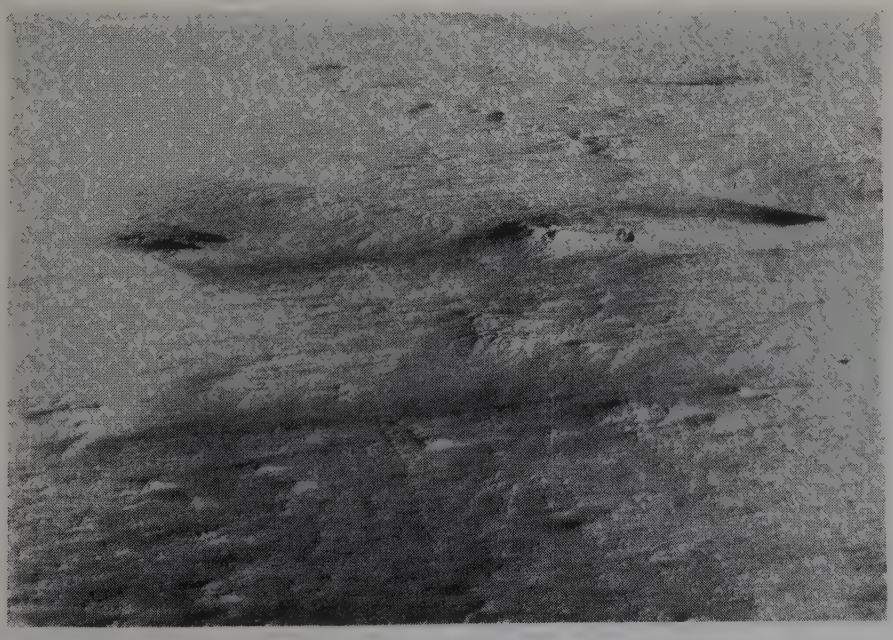
Fletcher and Koenig flew to Ellesmere and found a glacier with a surface strikingly similar to T-1 protruding over the sea. It could well have been the mother of the ice island, although its forward progress is so slow that it would have taken a couple of centuries to have given birth to a baby that big.

Then Joe and Lynn Fletcher, using the fingerprint technique, tried to match up the ridge pattern of the 1947 expedition's island with photographs of T-1. The effort failed. They concluded that the formations were two different chunks of ice. The Fletchers reported their findings to the Pentagon.

In May, 1950, the Air Force decided that if there were more of these natural landing fields floating around the Arctice they'd better locate them before anyone else did. The 58th Reconnaissance Squadron was ordered to make a concerted search—and also to find

(*Continued on page 63*)

**After the biblical prophet, who said (Habakkuk 1, 5): "I will work a work in your days, which ye will not believe, though it be told you."*



ICE ISLAND T-3 was found north of Siberia in July, 1950; covers 36 square miles

Radio Needs...

(*Continued from page 31*)

Commission (FCC) in connection with the frequencies to be used, and the International Civil Aviation Organization (ICAO), worked out a pattern in the VHF band, with 108.0 to 111.9 mc for approach and landing; 112 to 118 mc for navigation (VOR); 118.1 to 126.7 mc for eventual use by all multi-engine civil aircraft for air traffic control communications; and some additional channels for "operational control" assigned by the FCC to ARINC for airline company use, 127 to 131.9 mc.

In order to immediately acquire equipment capable of utilizing sufficient VHF communication channels without the delay and expense of post-war commercial developments, hundreds of 10-channel AN/ARC-1 VHF transceivers were bought by the airlines and modified to 20-channel sets by Schuttig & Co., Washington, in accordance with ARINC studies and recommendations.

As the controversy over the relative merits of ILS (radio) vs. GCA (radar) approach systems raged in government agencies, technical groups and among pilots, the airlines went ahead with their program of installing airborne ILS equipment (war-surplus BC-733 or RC-103 VHF localizer and R89B UHF glide slope receiver) and training their pilots in its use. The 75-mc VHF marker beacons were also included in the ILS pattern. In the end, both ILS and GCA were adopted as useful complementary low-approach aids.

The war-surplus three-channel R89B (AN/ARN-5) glide slope receiver was modified to a six-channel set for additional pairings with the ILS localizers, which in turn were modified to provide eight-channel in the 108 to 110 mc band (*see SKYWAYS, October 1951, Navicom section*).

However, until the complete switch to VHF can be made, the L/MF four-course range will continue as the primary navigational system. The very useful L/MF radio compass became standard equipment on the airlines as duel ADF (Bendix MN62 or the war-surplus equivalent, AN/ARN-7).

In 1946 the Airlines Electronic Engineering Committee (AEEC) was established. This group, consisting of airline technical personnel, works with the staff assistance of ARINC in setting up standards for aircraft radio equipment for the airlines. The first important job was to set up the "characteristic" covering the requirements of a VHF navigation and communication receiver in the 108.1 to 135.9 mc band: 100-kc channel separation (.1 mc) was specified, providing 40 channels for approach and landing aids (ILS localizer, 108.1 to 111.9 mc), including as a temporary measure three channels for VAR; 60 channels for enroute navigation (VOR or omnirange stations, 112.0 to 117.9 mc); and 180 channels for communications (air traffic control and operational control, 118.0 to 135.9 mc).

The Nav-Receiver characteristic was issued in March, 1947, to the aircraft radio industry. The Collins 51R and the Bendix MN85 were designed according to the ARINC specifications and during 1950 became available for the airlines and for large corporate aircraft making extensive use of the airways. To complete the VHF communications system, Collins brought out the 17L and Bendix the TA-18 180-channel transmitters (100-kc separation, 118.0 to 135.9 mc).

Wilcox Electric Co. of Kansas City came out with their type 361A VHF airborne communications system, consisting of 70-channel receiver transmitter in the 118-132 mc band (no ILS localizer, VOR or emergency military channels). This system was adopted and installed by Eastern Air Lines, among others.

Aircraft Radio Corporation of Boonton, N. J. developed Type 17 VHF aircraft communication system, including the R-15 tunable receiver in the 108-135 mc band and the T-11A transmitter with five crystal-controlled frequencies in any one-megacyle band between 121.5 and 132 mc; several transmitters may be cabled into the system to provide 10, 15 or 20 channels. For VHF navigation, including signals from ILS localizers, VAR, VOR, GCA voice, etc., Type 15A (now 15C) equipment was produced. These are all high-quality, lightweight sets, with CAA approved Type Certificate, but not designed to the ARINC specs for airline use.

The next step was to see how many communications channels would be required, using equipment available in the 1951-1954 period. During the next few years, it will be necessary to have a plan which will permit the use of the maximum number of SCS and DCS channels in a manner which is compatible with present and future planning. SCS is a single channel simplex, *i.e.* call up and reply on same frequency, and DCS is double channel simplex *i.e.* transmit on one frequency and receive on another.

An example of SCS is 126.7 mc for communication with INSACS (Inter-State Airways Communication Service stations). Both ground personnel (now called airways operations specialists) and pilots transmit and receive on this frequency.

A good example of DCS is 122.1 and 122.2 mc in the itinerant aircraft band. Pilots call INSACS on 122.1 and the airways personnel reply on 122.2 mc. A current check on the implementation of both 126.7 and 122.2 mc reveals that as of December 1, 1951 some 340 of the 414 INSACS in the continental United States (82 per cent) were equipped to transmit on 122.2 mc, and approximately 90 per cent on 126.7 mc, largely utilized by pilots of multi-engine aircraft.

To carry out the above major planning job, the Air Traffic Control and Navigation Panel of the Air Coordinating Committee (ACC/NAV Panel) requested the Radio Technical Commission for Aeronautics to study the Common System plans and documents bearing on communications requirements for the Transition Period (starting with its own now classic SC31 Report), and to come up with recommendations applicable to current and future needs. The RTCA is a cooperative association of all U. S. Government-Industry aeronautical tele-communication agencies, with several important user groups (including the military services, the Air Transport Association, Corporation Aircraft Owners Association, etc.) included on its Executive Committee.

CAA AIRWAYS traffic controllers scan flight progress strips which give planes' ETA's

The RTCA established a special committee (SC56) for this important project in March 1950, and after more than one year's intensive work by some of the nation's top experts, a report was issued on March 26, 1951. It was entitled "*Communication Frequencies Required within the band 118.1-126.7 Mc during the period 1951-1953 Inclusive and Recommended Implementation Thereof.*" Copies of this report officially designated as RTCA Paper 38-51/DO-31, may be obtained by any member of the Corporation Aircraft Owners Association by addressing The Executive Secretary, Radio Technical Commission for Aeronautics, 1724 F Street, N. W. Washington, D. C., mentioning CAOA membership. Making these reports available to member company pilots and occasional briefing of such reports by its Technical Committee has put CAOA into the position of providing for its member companies somewhat similar service in the rapidly developing aviation radio field as is rendered to the airlines by ARINC.

Members of SC56 included representatives from the CAA, FCC, military services, ATA, ALPA, private pilots and other user groups, with advisors called in from time to time from the airlines, aircraft radio industry, etc.

An additional factor in this fresh approach to the frequency problem was the recent development of direct communication between Air Route Traffic Control Centers (ARTCC, or simply the "Center," such as "Chicago Center") and the pilot. These Centers are established to provide adequate separation of air traffic within specified Control Areas, and the inauguration of the "direct to Center" communications link greatly simplified the control coordination problems. (SC56 recommended 120.3 mc [SCS] as the primary "direct to Center" channel; for the few exceptions, see *Airman's Guide*).

The first job of SC56, therefore, was to sort out and establish definite air traffic control functions. In the light of the recommendations of ACC/NAV Panel's SWG-5 report ("Swig-5), on which several SC56 members worked, radar control procedures also had to be fitted into the functions of both Center and Tower.

The Center has three functions: (1) Inbound air route traffic control, to provide separation and orderly sequencing of aircraft approaching a terminal until such aircraft are released to the jurisdiction of the Tower; (2) Out-bound air route traffic control, after the aircraft leave the jurisdiction of the Tower; (3) Radar control, to provide navigational guidance and advisory information by reference to a radar scope. Each of these functions requires a minimum of one VHF channel.

The Airport Traffic Control Tower (or simply "Tower," *e. g.*, "Cleveland Tower") has five functions: (1) Approach Control, to provide separation of IFR (instrument) air

traffic approaching to land at an airport, and maintain an orderly flow of this traffic from the time it leaves the jurisdiction of the Center; (2) Local Control, to provide separation between aircraft landing or taking off at an airport (instrument and contact conditions); (3) Ground Control, to provide separation between aircraft, and between aircraft and obstructions on the movement area, and issue air traffic control clearances to IFR departures; (4) IFR Departure Control provides separation between departing IFR aircraft and other IFR aircraft under Tower jurisdiction from the time they leave Local Control until they come under jurisdication of the Center; and (5) Radar Control, which provides navagational guidance and advisory information by reference to a radarscope. To handle these functions, a total of five or more VHF channels may be required at a single tower. Depending on the area, by 1953 as many as 30 VHF frequencies may be required to provide channels for all towers involved and the Center.

Based an the above eight functions, SC56 analyzed the higher density areas of the United States to determine the number of frequencies required for air traffic control communications during the period 1951 through 1953. The studies were too elaborate for inclusion here, but the results are illustrated on the accompanying map, based on the SC56 report.

First of all the area within a radius of 200 miles of New York City was selected for detailed study because the demand for VHF channels in this area exceeds that of any other area in the country. By the fall of 1953, 43 control towers and two ARTC centers are expected to be operating on VHF in this area. Based on a desirable 180-mile co-channel separation, this would involve a total of 45 VHF frequencies. As this is obviously beyond the capabilities of existing airborne equipment, this was reduced to a still-acceptable 125-mile co-channel separation, For this a minimum of 30 VHF channels will be required.

In an appendix to the report, figures were worked out for VHF channel requirements of Towers and Centers within 125-mile radius of five highly congested air terminals—Cincinnati Area, Cleveland Area, Chicago Area, Kansas City Area and Los Angeles Area (*see map*).

Multi-engine aircraft operators requiring maximum flexibility in IFR operations and desiring to retain 122.1, 122.2, 122.5 and 122.8 will have to add these four channels to all of the above totals. The 122 mc band has been excluded from all present Common System planning on the grounds that single-engine aircraft will not be able to carry the airborne equipment necessary to provide the required channels.

Here is a complete list of channels and order of selection for use, *i.e.*, 118.3 mc will be used first where possible, 118.7 mc is the next choice, 119.1 the third, etc.

Channel	*Sequential Order*
118.1	International
118.3	1
118.5	8
118.7	2
118.9	11
119.1	3
119.3	9
119.5	4
119.7	10
119.9	5
120.1	13
120.3	12
120.5	14
120.7	6
120.9	15
121.1	7
121.3	Low Activity Towers
121.5	Emergency
121.7	Ground Control
121.9	Ground Control
123.7	27
123.9	26
124.1	25
124.3	24
124.5	23
124.7	22
124.9	21
125.1	20
125.3	19
125.5	18
125.7	17
125.9	16
126.1	29
126.3	28
126.5	DCS Air-to-ground
126.7	Communication with INSACS

PIPER SUPER CRUISER is owned by Dr. N. Gouroff of Val d'Or, Quebec, Canada. Dr. Gouroff is Canada's "flying dentist." A vet of both wars, Dr. Gouroff flies into lumber camps and small towns in northern Quebec, looking after the dental needs of the inhabitants. His son acts as pilot and is a partner in the venture

To this list may be added the four channels in the 122 mc band (122.1-2-5-8) presently provided for so-called "Private Aircraft Stations" (personal planes). Use of VHF Communication channels by the vast majority of private pilots and those of smaller corporate aircraft has been largely confined to 122.1 for calling INSACS and 122.5 for towers (122.2 mc for receiving messages from INSACS is new and 122.8 "unicom"—air-to-ground, ground-to-air, air-to-air—has hardly got going yet). However, according to a revision of the FCC regulations effective October 1, 1951, any pilot having need for additional channels, and if flying a properly equipped aircraft, may apply to the FCC for use of any or all of the thus far implemented channels in the 118.1 to 126.7 mc band. (Channels in the 118.1 to 121.3 mc band have been available for about a year to corporate aircraft pilots for approach control only.)

Most of the channels in the band 118.1 to 121.9 mc, plus those in 122 mc and 126.7 mc, have been implemented for some time. The remaining batch, from 123.7 to 126.5 mc, will be set up as fast as requirements for their use are established.

In anticipation of this need of considerably more VHF frequencies than is provided by the modified 20-channel AN/ARC-1, the Air Traffic Control & Navigation division of the ATA and ARINC engineers cooked up a deal to make available during 1951 a relatively low-cost 50-channel VHF transmitter. The plan was subjected to detailed analysis by SC56.

A conversion kit for the modified ARC-1 was developed and manufactured by Aeronautical Communications Equipment, Inc. (AEROCOM) Miami, Florida, which would turn it into a 50-channel set (*see September 1951 SKYWAYS, page 64, for photo and further details*). Original price of the kit was $125 (about $230 installed), but since well over 1,000 units have been sold up to October 1, 1951, the price is reported to have been slightly reduced. It has become standard equipment for all the airlines, including Pan American which played an important part in its development. As at December 1, 1951, the 50-channel modified ARC-1 was installed in 95 per cent of the U.S. fleet of some 1200 multi-engine scheduled airliners.

The problem for corporate aircraft owners is that very few of the converted military transports or bombers were equipped with the AN/ARC-1, largely used by the Navy. Most of them had the Air Force AN/ARC-3 eight-channel set or one of the earlier four-channel SCR-522 or AN/ARC-5 units. The ARC-3 has been modified by Schuttig & Co. (and others) to a 24- or 32-channel set by interpolating the necessary crystals on a three-for-one or four-for-one modification of the original eight channels. The AERCOM kit for the ARC-1 provides channels on a

(*Continued on page 48*)

Radio Needs...

(*Continued from page 47*)

five-for-one basis.

ARC-1's were selling in the $700 to $900 bracket, but are now several hundred dollars higher and fairly hard to get. Several CAOA member pilots have reported making efforts to secure an ARC-1 for modification to 50 channels. The Wilcox 70-channel VHF communications system would also fill the bill, and NARCO is reported to have under development a multi-channel transmitter which it aims to have type certificated to help meet these new requirements.

The latest CAOA *Directory of Executive Aircraft* (October 1951) indicates that its members have attained very high standards in the matter of installation of radio equipment. For navigation, nearly 98 per cent of the multi-engine aircraft listed have as a minimum: L/MF Range receiver, ADF, VOR, ILS and Marker Beacon receiver. Considerable numbers have in addition: dual ADF, dual ILS, dual VOR, plus nearly 100 with auto-pilot (many with A-12 auto-approach) and more than 30 with *Zero Reader*.

For VHF communications the figures are also impressive, but reveal room for some improvement in the light of the developments outlined in this article. Of the medium-weight corporate aircraft (*Lodestar* and up) nearly 25 per cent have available the complete list of 40 VHF transmission channels in the 118.1 to 126.7 mc band as shown above, with tunable VHF receiver from 108.0 to 135.9 mc. Aircraft in this group are all set for several years at least. An additional 35 per cent have from 16 to 20 channels (a few up to 24) available on a push-button basis, with modified war-surplus equipment. In a pinch this latter group can get by for another year or two. But by mid-1952, if highly congested areas are to be used, pilots will require a greater number of channels.

It is the remaining 40 per cent of the multi-engine fleet which should be really causing some concern. About 25 per cent are still getting by with their eight to 10 channels under 1951 conditions, but they will feel the pinch soon. The final 15 per cent are carrying four or five transmitter channels only, and as Ralph Piper, chief pilot of the Monsanto Chemical Company fleet, expressed it several weeks ago during a visit at CAOA headquarters, Washington, "I don't see how in the world they are getting by with it; we have had to have around 20 channels for some time now."

In conclusion, it should be noted that nine out of 10 of the post-Korea conversions for corporation use of DC-3's, *Lodestars* and PV-1's have been provided with 180-channel transmitters, also that a considerable number of CAOA member-company pilots have contacted the Washington office for guidance in routing through the proper channels in the Office of Aviation Defense Requirements (CAA) their orders for the latest models of VHF radio equipment, in order to get in line with requirements of the present and near future.

It all adds up to the fact that if pilots are expecting to fly in congested areas under IFR conditions and under the accelerated air traffic control procedures now going into effect, they will only be able to do so if their planes are properly equipped.

PLANE CAPTAINS aboard the carrier, *USS Rendova*, check their pilot's harness straps before engines are started. Carrier is off Korea coast

Executive Pilot

(*Continued from page 35*)

Fred points out. "If one engine conks out, we can get 'er by on the other. Why not two sets of radio equipment for the same reason? An airplane, like most other things, is only as strong as its weakest link".

At about 6:30 PM, "Reddy Kilowatt" silvers through the lengthening shadows above the Roswell airport. Fred calls the tower for landing instructions, using his plane's number—7388—which is known and remembered by tower operators the country over. They remember it because Pilot Dick arranged to combine numbers with a special significance: in radio language, "73" means "best wishes," "88" means "love and kisses". In parleyvooing with towerfolk who have been especially nice, pilots often sign off with the "73" when chinning with men, and the "88" when bidding adieu to female operators.

"When the tower people hear my best-wishes-love-and-kisses-number, they all perk up and treat me right", Fred says. "Sometimes the gals get the giggles".

On landing, Fred gives detailed instructions to a Roswell service operator for refueling and overnight storage, taxies into town, eats himself a T-bone, and hits the sack early at a local hotel.

At daybreak the next morning, Fred gets the CAA weather reports and, finding the way clear, has a quick breakfast and beats it back to the airport. He checks the plane and gets her ready to roll. Promptly at 7 AM, Hiram Dow and Gale Armstrong, prominent Roswell citizens and directors of Southwestern Public Service, alight from a car, step briskly to "Reddy Kilowatt," shake their pilot-friend warmly by the hand, and hop in ready to go. They deposit their brief cases within easy reach, fasten their safety-belts with experienced fingers and relax for the take-off.

An hour later, the plane lands at Amarillo, 215 miles distant, and SPSC President J. E. Cunningham and Director Don Harrington enlarge the passenger list to four. Within another 40 minutes, Director Clifford Jones is picked up at Lubbock (115 miles) and the cargo is complete. It takes Fred an hour and a half to traverse the 295-mile skyway to Dallas and glide in for a satin-smooth landing at home base. In the meantime, President Cunningham and Director Armstrong have taken turns riding in the co-pilot's seat, each displaying a working knowledge of the controls and, as a matter of fact, holding the plane on course for short periods of time. Their deep personal interest in "Reddy Kilowatt," and their familiarity with its operation, is another evidence of Fred Dick's evangelism. An even greater tribute to his sagacity is Board Chairman Nichols' ability as a pilot. He frequently flies the plane, with Fred there beside him, and has a student pilot's permit. Dick swears that, in an emergency, Mr. Nichols could land the Beech by himself.

By 10:30 on the morning of their departure from their homes, the five are in Nichols' offices in the downtown Mercantile Bank Building, Dallas. In mid-afternoon, the board session is completed; the air-minded quintet returns to the airport and, before dark and dinner, all are back within their family circles. Early the next day, Fred returns "Reddy Kilowatt" to the fold at Southwest Airmotive. In his ranch-style home in University Park, he rests for a while with his wife and three children, but is on the alert for another call from the boss which may send him and "Reddy Kilowatt" to any corner of the United States.

Nichols and Fred Dick point to their director-roundup as a good example of modern executive aircraft at work, saving the time and energies of high-salaried personnel, giving them range far beyond the ordinary, with transportation schedules as flexible as the swift turn of events in field and factory throughout the land. Neither contends that the big planes are all things for all companies, but they do say that, in an industry with scattered interests and roving key personnel, the private "magic carpet" can more than pay its way over a period of years. They add, though, that an airplane is like a horse and must be used frequently and wisely for maximum economy. It can eat a lot of oats if kept in the barn.

Southwestern Public Service Company uses "Reddy Kilowatt" in excess of 100,000 miles (500 air-hours—2500 railroad-hours) per year and estimates the operating cost at $24.67 an hour, not counting the pilot's salary, aircraft depreciation and insurance. In calculating the cost of a twin-engine Beech operated 600 hours a year, the manufacturer reports the complete hourly operating cost to be about $68, including fuel and oil, pilot's pay, hangar storage, maintenance, insurance, public and passenger liability, and depreciation over a five-year period (with 20 per cent residual value). SPSC is depreciating "Reddy Kilowatt" in four years. Using the Beech factory statistics, the cost per airplane mile is less than 35 cents, and the cost per seat mile is less than 7 cents! Many claim Beech's estimate is low and that the hourly operating ante runs from $75 to $100. It is a tribute to the executive airplane's usefuless to business that most of the owners consider it worth every penny of the cost . . . and plenty more. It's a tribute to the executive pilot, too, who guarantees this evaluation by being the thoughtful skipper.

Cops in 'Copters

(*Continued from page 27*)

In all, we spend $25,000 for extra police assistance for New Years' Day. In turn we are repaid by the City of Pasadena, the Tournament of Roses Association and the Pacific Coast Football Conference, sponsors of the Rose Bowl event.

In the past years, Al Dixon, our senior radio dispatcher, has flown with me on all New Years' Day assignments. He talks directly to KGJX, and KGJX relays instructions to the police cars and motorcycles on the street.

For the 1951 parade, we merely used a stock motorcycle two-way radio unit, complete with battery, for the helicopter installation. The whole unit weighed only 60 pounds and our maintenance crew installed the set in the helicopter in less than an hour.

The 'copter was furnished by Los Angeles Airways, the first airmail helicopter service in the whole country. We used a standard model Sikorsky S-51 piloted by Fred Milam. Al Dixon handled the actual radio communication while I did the spotting.

The helicopter is just about ideal for this type of traffic control for many reasons. Its advantage over the fast-flying heavy conventional aircraft is obvious. If you're trying to see what goes on at a key intersection that is half camouflaged by trees, you can't do much good at 150 mph. The advantage of the 'copter over a lightplane is similar, plus that extra safety item that in an emergency you can land a 'copter almost anywhere while a light single-engined ship can quit at any time and you have virtually no place to land. All available open space of the size required by a lightplane is packed with parked cars. The advantage of the helicopter over the blimp lies in its ease of landing. Normally, with the blimp we remained in the air all morning and landed only once, because it took such a large ground crew to safely set-down the gas bag.

In the helicopter there are no such problems. There is no ground crew and hops can be as frequent as conditions require. Last year we were over the parade within three minutes after take-off and many flights were of less than 15 minutes duration. When the ship was not needed, we landed at the regular air mail heliport in South Pasadena. Our own Pasadena heliport is situated on the corner of the Carmelita Golf Course directly adjoining the parade line of march and the whole area was jammed with parked cars and spectators.

While the parade was actually in progress and there was little movement of vehicles, we flew east to the Monrovia Airport and refueled. Then we came back over the crowd and helped direct traffic as the parade broke up and visitors headed for the game or the races—or home.

Specifically, airborne control of ground traffic works out so well because the man in the air sees the complete picture of what is happening. He can spot areas that are not lined solidly with cars and direct patrolmen on the ground to route traffic in that direction to ease main-line congestion. He can spot intersections where patrolmen have misunderstood the printed directions and are routing traffic in the wrong direction. And he can spot breakdown of floats in the parade and advise the parade committee to send a standby tow truck.

This matter of having motor-driven floats stalled along the line of march is very important. Should there be a large gap in the parade toward the end of the line, spectators are apt to think the whole parade is over, and break out into the street and clog the whole artery. Under such conditions it is almost impossible for patrolmen to control the crowd so we try to keep the parade moving along as evenly and smoothly as possible.

Last year we spotted one intersection where the patrolman had left his corner for some unknown reason and traffic was jammed. We contacted the ground station and had a motorcycle officer on the corner within a minute or two.

One motorist going to the parade ran out of gasoline on the Arroyo Parkway that runs from Los Angeles to Pasadena. There is a six-lane super highway that carries the bulk of the traffic to and from Pasadena. This one stalled car blocked a third of the three eastbound lanes before the parade, and as a result traffic was backed up behind this car for as far as you could see. We were able to spot the driver with his little red can of fuel trying desperately to cross this heavily traveled road to get back to his car. It took him over five minutes just to cross the highway!

Before the parade started and while 'copting over the area, I relayed current traffic information to the local CBS station, KNX. This info, in turn, was broadcast to people driving to Pasadena, advising them of the best way to travel.

One of our annual problems is to decide when to close the main Colorado Street bridge that leads directly into the beginning of the parade. At one time traffic was backed up behind the bridge for five miles, but we kept the bridge open as long as possible—just as long as one lane of traffic could trickle through the confusion at the formation area.

Our pre-arranged plan calls for a number of one-way streets. One street near the end of the parade, for instance, is one-way to the west until 11 AM when the parade passes. Then it is one-way in the other direction so that visitors can get out of the area quickly. The Colorado Street bridge is closed to autos immediately after the parade until the bulk of the pedestrian traffic has walked out of the area.

Weather conditions on the day of the parade have a lot to do with last-minute changes of plan. In 1951, for instance, the New Years' morning was cold and windy. Spectators stayed at home until the last possible minute. Consequently, we had an unprecedented jam of traffic at the last minute. Starting time and volume of traffic is almost impossible to predict, and the only way we can handle the problem is to look it over from the air and improvise as the needs develop.

In the past 10 years there has not been a single traffic fatality within the city limits of Pasadena on New Years' Day.

The patrolman on the ground is limited in his scope of vision to two or three blocks in any direction. He can easily misdirect traffic to areas beyond his field of vision where traffic jams result. The airborne controller has a good picture of the whole area and is absolutely invaluable in keeping masses of cars moving steadily.

The Los Angeles Sheriff's Aero Squadron, under the direction of Captain Sewell Griggers, does an excellent job of policing the air above the parade and game. No one flew below the designated minimum altitude of 2500 feet indicated in 1951 and, to my knowledge, no citations were written for pilots. Even the sign-towing Stearmans were required to maintain that conservative altitude. Air traffic over both the Rose Bowl and parade area was left-hand, and two Aero Squadron planes were in the air all the time to see that the regulations were strictly enforced.

I believe that the helicopter, because of its ease of handling, lack of ground crew, and facility of landing in any vacant lot, is the best possible aerial platform to use for directing traffic. As more and more automobiles congest the streets of Southern California or, for that matter, any other large city, I can see the day when it would be very practical for Police Departments like ours to have a contract helicopter available for traffic control. Large cities like New York and Chicago have the finances to use helicopters owned and operated by the Police Department, but we are not yet in that enviable position.

So add another item to the list of the countless unusual uses of the helicopter—the control of large masses of automobiles. Whether Rose Parade or major disaster, I want a helicopter in the air over Pasadena to take the cork out of our traffic bottlenecks. You can't beat it!

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Keep Down Upkeep

(*Continued from page 23*)

over you, inspect your work and sign off each job in your logbook."

And then Howes burst a one-sentence landmine which has been exploding unexpectedly in the faces of more than one plane owner at Vail Field, near Los Angeles. "You know," he said, "I keep this Ryan in the air with an average maintenance bill of $100 a year!"

The fledgling took off toward the hangar, mumbling incoherently about the greasy-mitted prevaricator he'd just bumped into. Bill Howes went back to his work, the painstaking maintenance job which has sliced his annual maintenance bill to just $100.

How'd he do it? "Simple," Howes continues, "I've got $50 worth of assorted tools. And I can read directions. Read well enough to follow the manuals, like the CAA's Manual 18 and its newer Manual 101. No, I don't have any special mechanical aptitude . . . just average. My only talent is a penchant for saving myself a buck."

What Bill Howes has done to keep himself airborne should be an inspiration to other private-plane owners. There are several ways to go about it. Across the country, for instance, self-service hangars are springing up, designed to give the guy with a limited budget but with a yen to fly, a chance to do his own maintenance. A & E's who run these hangar shops charge a flat rate to oversee your work. When they sign each job off in your logbook, they take the responsibility, as far as the CAA is concerned, that the job is done correctly.

Flat rates for overseeing your work are usually based on the 25-hour, 100-hour and annual maintenance stints. Take the annual relicensing inspection, for instance. Any plane owner who farms relicensing maintenance out to a certified aviation and engine mechanic can expect to pay anywhere from $80 to $150, maybe more. The mechs charge the standard $4.00 an hour, plus materials, and both bills mount up fast. Some guys can afford an A & E's services, but a lot of them can't.

Bill Howes is one who can't. Last year his annual inspection cost him just $25. He paid a certified A & E a flat inspection charge of $12.50. A couple of bucks more went for hangar rent, covering the two days he had his ship under roof while he was working on it. The rest went for materials. Bill put in about 32 hours over two weekends readying his ship for licensing. Right there he saved himself $128 in mechanic's fee.

One of the reasons for his extremely low re-licensing bill was that all year long Bill had kept up his ship, had done nine-tenths of the work himself. A couple of months ago, for instance, he inspected the fabric and found it bad in places. He patched the ship, resilvered the fabric, primed all the metal with chromate primer, and painted it with synthetic enamel. Bill spent 30 hours on this job. It was painstaking work, consumed a lot of flying time, but the whole job cost only $55. Bill paid $15 for supervision of the job. Another $40 went for materials. The same job, handed over to the hangar shops, with a blanket, "Fix 'er up, boys," would have cost him $150, minimum.

Howes also covered both ailerons for $6 apiece, including fabric and dope.

PIPER SUPER CUBS are shown here lined up prior to delivery to Rio de Janeiro, Brazil. They were purchased by Brazilian Govt. for use by Brazilian Aero Club

Bill runs his own 10-, 25- and 100-hour maintenance inspections as well. Flying anywhere from 150 to 300 hours a year, he finds that inspections come up pretty frequently. Ten-hour inspections take him half a day—and save him $15 to $20 over the cost of having a mechanic do the same work. During the 10-hour, he checks the prop for nicks, cracks, looseness and for wobble. He goes over each bolt carefully, because his penchant for aerobatics tends to loosen up the ship. He checks the engine mounts, gives all control surfaces a good going over, including cotter pins. He inspects the dual controls for play. Often, a 10-hour costs him nothing or, at tops, only a few bucks.

Bill finds that his Ryan's Kinner engine needs to have its rocker boxes atop the cylinders repacked and carefully inspected every 25 hours. Repack materials cost him about $1.50; labor, not a red cent. The same job, farmed out to a licensed A & E, would cost $12.

About every 100 hours he repacks the wheel bearings. Some time ago Howes bought a pound of grease for 40 cents, figures it's good for maybe 50 repacks, or about 8 cents a job. A good mechanic would charge $4 to $5.

Howes admits that being a "do-it-yourself" pilot keeps him on the ground more often than he'd like. But if he didn't do his own work, he'd be grounded permanently, kept there by high maintenance costs.

Howes' ship is no different from the average. You can figure a patch a month. Patches have an uncanny way of running up the yearly maintenance bill. At $4 to $5 for a minor patch, it doesn't take many to add $50 or $60 to annual repairs.

"Bought myself a yard of fabric for $3," Bill explains, "also latched onto a gallon of dope for $2.75. That's enough patching material for a year of average-size, run-of-the-mill patches. I figure my yearly patching costs at about $6. No, not $6 a patch. Six bucks for the whole year!"

Consider for a moment the normal week-to-week upkeep on any aircraft. The little things. Howes does all the routine jobs on weekends, estimates that he saves another $50 a year on labor.

His $50 worth of tools are good for the ship's lifetime. He gets by nicely except for a few special tools which he manages to borrow, beg, or rent when he needs them. One of these "specials" is the prop-hub pulling tool. A friendly mechanic usually tells him to "go ahead and use it, but bring it back."

Concludes Howes, "If you do your own work, you can keep your plane in the air, with the exception of gasoline, cheaper than running the old flivver around town." These aren't idle words. Bill Howes, like many another limited-budget pilot, wouldn't be airborne today if he didn't do his own work.

A couple of years ago a frustrated private-plane owner wrote on irate letter. "I'm giving up my plane," he announced unhappily to the aviation world. "Seems that according to CAA regulations about the only work I can do myself is sweep the darn ship out. And only then, mind you, if an A & E's hawking over my shoulder."

Trouble with that pilot was that he never read the regulations—or else he was a mechanical scaredy-cat. Any licensed pilot can do his own repair work providing an A & E supervises and signs off the job.

To get the mechanic's side of the story, we ought to hear from an A & E, like Bill Russell, who's been in the aviation maintenance game for 33 years and who holds a coveted mechanic's license Number M-2195.

Neither Bill Russell nor any other mechanic whose livelihood depends upon aircraft maintenance and the private flyer can be expected to cheer the "do-it-yourself-boys." But today's mechs are realistic. They know that inflation and rising maintenance costs could well drive the marginal flyer out of the wild blue yonder. So, while they aren't clapping their hands in approval, they aren't sitting on them either. They believe in lending a hand—if it will mean more plane owners.

How much can the private flyer save by doing his own work?

"Plenty," says Bill Russell, in his winning Scotch accent.

"Often a pilot brings his ship in for a 100-hour inspection or an annual. We look it over, draw up a list of necessary repairs. The pilot checks off the work he thinks he's skilled enough to tackle. We do what's left, inspect his job, and sign off the work. That way, he can cut the maintenance bill in half."

Let's see how the mechanic views these savings.

"A lot of aircraft maintenance," explains Bill, "is the fault of the owner. He doesn't do enough day-to-day checking. He lets little troubles grow until it's a full-fledged job for an A & E . . . and expensive. He can begin shaving his maintenance bill by watching the little things. He ought, for instance, to check his baggage compartment to see that its floor isn't corroded. A new floor will cost him $4."

Any plane owner with average mechanical aptitudes, thinks Bill, can apply varnish and

wood preservatives to his ship, and save $50 during the year.

Keeping the metal parts ship-shape and free from corrosion will cut another $20 or $30 off the relicensing bill. Fabric is another costly item. But if the plane owner washes fabric with fresh, cold water (no additives) during the life of his ship, he can avoid a yearly recovering and save himself $600.

"Tests prove," declares Russell, "that grit left on wings and upper surfaces overnight collects moisture. Wind action causes this grit to pit and scratch fabric. It's particularly damaging near the sea coast or near industrial areas."

Preventive prop maintenance can save the plane owner $15 or $20 a year. Warns Russell, "Make sure the prop's left horizontal, not vertical, so both ends receive the same amount of moisture. Otherwise, you'll wind up with a warped prop and a nasty bill!"

While prop care varies with the type of propeller, there are some general "do's" and "don'ts." Don't varnish the toothpick-type prop. "That," says Russell, "tends to unbalance it." Metal props should be washed off with aviation-type cleaner or thinner, and carefully dried with a rag. The prop's front surface shows more than the back, but the back is more susceptible to nicks and indentations. Apply some dull-finish protective paint to the prop's back side.

Russell says you can save the cost of a tire each year by watching excessive inflation. Oil-impregnation and weather checking are other tire enemies.

What's the single biggest maintenance reducer? Says Russell without hesitation, "It's saving yourself and your ship one accident a year." How? Simply by using the proper-type brake fluid, and by inspecting control cables where they pass over pulleys or airleads.

Maybe every private-plane owner can't do enough of his own work to cut his yearly maintenance bill to $100 as does Bill Howes, but he can do enough, if properly supervised, to hold costs within reasonable limits.

Aviation isn't a rich man's sport—not if you aren't afraid of a little grease, can follow instructions, and have the courage to dive in and have a try. Thousands of plane owners are discovering, in these days of inflation, that self-service can keep both planes and themselves airborne.

Don't let the auctioneer, as he sells your trim little ship on the block, close the sale with, "Here lies America's private-plane owner. High maintenance costs scared him to death." There's not need for it.

Build Business . . .

(*Continued from page 33*)

personal contact with these diverse ends lying on either side of the Rockies is a gleaming Twin-Beech which, when not traversing the skyways, occupies tie-down space at Galvin Flying Service on the east side of Boeing Field in Seattle. In the Twin-Beech, together with pilot Wally Hanson and carrying passengers, Allison logs from 500 to 600 hours a year on business trips.

However, this average of 50 hours flying time a month does not represent his total air time. Allison's favorite hobby is flying, and for this purpose he has his own four-place Aeronca *Sedan*. Equipped with floats, the Aeronca is moored on Lake Washington, just beyond the edge of the Allison front lawn.

The lightplane is purely for pleasure: hunting, fishing and short trips, is equipped with only a primary flight group and a small Airadio.

At one time, he owned a Ryan *Navion*. "I bought the *Navion* before I knew how to fly," Allison reported. "I learned to fly with the *Navion*, and soloed here. Then I went to Arizona, got my pilot's license, and flew back."

He likes a long runway and is not content with a mere 2200 feet, though he recalls the time in Walla Walla, Washington, when he took the *Navion* off in 300 feet, just to prove it could be done.

The Allied Company looks with uneasiness on such stunts by its valuable and youthful executive. When he is flying on business his company insists on a twin-engine aircraft and a pilot. Wally Hanson, World War II flight instructor and veteran of a year in the China-Burma-India theatre where he flew the Hump, has been with Allison since May 20 of this year. "Mr. Allison is very easy to get along with," explained Hanson. "He spends most of his time in the cockpit with me. He's very serious about everything connected with flying, and he bends over backward to help a pilot in every way."

Wally Hanson is an invaluable aide to Mr. Allison, for in addition to being a pilot he is a qualified mechanic. "Wally supervises installations and he makes sure we get what we pay for," says Allison. Hanson does minor upkeep himself. Having had the Twin-Beech only about three months, no major work has had to be done on the plane as yet. The airframe has 900 hours on it and the engines, 115 hours. They have installed some new instruments and other additional equipment, the work having been done for the most part at Cy King's Flightcraft, Inc., in Portland, Oregon.

"At present, plans are for building a hangar and installing the gear necessary for doing most of our own maintenance," says Hanson, who spends a full day with the plane every day, whether it is in use or not.

The Twin-Beech has everything in the line of equipment.

"You might say that we have three transmitters and four receivers," says Allison: "two VHF transmitters (which gives us nine channels) and a 100-watt Collins transmitter . . . also a standard LF receiver, a VHF receiver (ARC 17), and ADF LF receiver, and VHF on omnirange."

The Beech has what Mr. Allison believes to be one of the nicest interiors he has seen in a plane. It is furnished with a couch and three chairs, upholstered in blue and gray, a card table and gray carpeting.

Allison claims the plane's only drawback is that it limits the number of persons he sometimes likes to take along on trips. If the passenger load is heavy, then the gas load must be limited. Fully fueled, the Beech carries enough gas for over six hours flying time, though they never stretch it to the limit.

This plane is one recently traded for another Twin-Beech of the same model, and there have been several unusual expenses connected with the exchange that would not give a fair estimate if figured into hourly expenses. Whatever the cost may be, one thing is certain: a man of Mr. Allison's position and business acumen would not be using the plane if it did not offer a saving in time and money. Indeed, when Allison isn't able to make it "pay out" for the Company, he doesn't use it. This was demonstrated recently by his trip to New York via scheduled airline. Since he was the only person from Seattle going to New York to attend a scheduled meeting, he figured it would be a saving to leave the Beech at home rather than use it for one passenger. So the Beech and its pilot stayed home.

Late this past summer Earl Puckett, Chairman of the Board of Allied Stores, flew West in the company DC-3. As he and Mr. Allison conferred in the plush interior, a play-back of history would have revealed an interesting picture: In 1916, the Boeing factory was but a dream in the mind of W. E. Boeing who, on June 29 of that year, had completed his first plane: a two-placer of baling wire and spruce sticks capable of 85 mph. The same year, young Earl Puckett, now head of a corporation which owns between 70 and 80 of the country's largest department stores, was teaching school in Illinois. He was 18 years old, and was making a salary of less than $600 a year. Rex Allison, age 6, was living on his father's farm near Birmingham, Kentucky. Here were three of diverse interests from diverse places who, years later, were to share a common interest—aviation—within easy operating range of each other.

Following their meeting in Seattle in late August, Allied Stores officials, flew to Spokane and to Boise, Idaho. One development of the week was the purchase of the Palace store in Spokane and its addition to Allied's empire. Its supervision will fall to Rex L. Allison, and aviation will be his instrument of development.

HAWKER P.1067 interceptor is now in production for the Royal Air Force. It is powered by Rolls-Royce *Avon* turbojet engine rated at over 6500 pounds thrust

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(Continued on page 54)

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(*Continued from page 53*)

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Bold Pilots Do Grow Old

(*Continued from page 43*)

home after that, before taking off. But the point I'm making is that if I could lick my worry about haze, so can you.

Why get used to flying haze? Certainly not because you plan to take off on cross-country when haze is thick. You'd be silly to do that. But you may start out in weather that is clear as a bell, and plunge into an industrial area 50 miles away where visibility is down to one or two miles. I did it myself, recently, going into Pittsburgh. At Altoona I could see for 25 miles. At Pittsburgh it was a bare CAA minimum. And yet I came in having filed a flight plan, and made my contact with the tower and landed and was never worried for a minute. My training at home paid off then. If I hadn't hardened myself to haze, I would definitely have sweated out that Pittsburgh landing.

Finally, let's consider airport traffic. If you have learned to fly out of some pleasant rural grass field, where there is maybe one other plane aloft at the same time you are, traffic probably has never entered your mind. It will, however, if you have occasion to go into a place like Teterboro or even Morristown! The air will seem literally full of planes traveling at fantastic speed. You will have to divide your attention between flying the plane and listening to the radio. It will be a real headache, even on the ground, when the pressure is heavy at the end of the runway to get the ship up and out of the way so others can come in. It is at a time like this that an accident can happen. Mag checks may be skipped. Take-offs may be made with the fuel valve off or turned to the wrong tank. Unless you have made a point of getting used to traffic and being talked to by the tower, this whole situation can get really hectic.

My advice is to go into some big airport near your home with an instructor along. After you land, call up the tower, explain what plane you are flying and why you are there. Then go and shoot landings for a forenoon, getting exposed to all the routine matters you will meet on X-C if you land at major airports. A good tip on flying out of a big airport is to make your complete take-off check twice. Make it once before you get out to the end of the runway. Make sure your gas valve is on, the fuel supply is okay, the mixture is rich, the controls have full travel, your oil pressure and temperature are all right, and that your flaps are right for take-off. Then, if you get pressured into anything out there on the end of the runway, you'll at least have made the basic checks *for sure*, and nothing really serious is apt to happen. Don't make this safety check a substitute for your end-of-the-runway check, however. Always test your mags and carb heat at the last moment, also the freedom of the controls! Another little trick which I have developed the habit of doing is to check the primer knob to make sure it is fully engaged and not hanging open. An open primer knob can make your engine miss, even fail.

Don't let this article dismay you. The old saying "forewarned is forearmed" is just as true today as when it was newly coined. You can't be a milktoast and be a good flyer. You have to be bold—bold, I said, *not foolhardy!*

NAVICOM

Development Simplifies Flying

Collins' New Integrated Flight System Simplifies Pilot's Job

by Col. N. F. Silsbee

A glance at the instrument panel of any of today's multi-engine aircraft from the Twin Beechcraft on up will convince anyone that flying the airways under instrument flight conditions (IFR) calls for a high degree of pilot skill. Any sound development which will simplify this job is worth looking into. One such development is Collins Radio Company's Integrated Flight System.

Recently Cole H. Morrow, chief engineer of the J. I. Case Company and Board Chairman of the Corporation Aircraft Owners Association, and the writer had an opportunity to see the Collins system in a flight demonstration at Washington National in one of the company's Twin-Beech aircraft. At the controls was Cameron T. ("Robbie") Robertson of Port Washington, on loan from Pan American, and enjoying a busman's holiday while demonstrating the Collins equipment to airline personnel in various parts of the country and to the Air Force and Navy. The demand for such demonstration flights has been so great that a second Twin Beechcraft has had the system installed.

Panel Rework ▶ Most multi-engine pilots have felt that there is a fundamental need for a complete rework of the instrument panel, especially as regards the flight group. Three somewhat related groups of pilots and radio engineers are known to approve this position, and in one way or another are working toward a solution. They are Aeronautical Radio, Inc. (ARINC), the Air Navigation & Traffic Control Division of the Air Transport Association (ATA-ANTC), and the Air Line Pilots Association's (ALPA) Engineering & Air Safety Department. The safety angle is one that can hardly be over-emphasized, especially in the light of several disastrous crashes during the past year or two, in some of which at least it was quite apparent that the pilot was off his course.

Owing to the inherent flexibility of corporate-aircraft operation where the chief pilot and executives of each company can make their own decisions regarding equipment, alterations in the aircraft, etc., several companies have had their planes' instrument panels reworked according to their own ideas. Among these are Sinclair Refining, Monsanto Chemical and J. I. Case Co. Reynolds Metals is coming up with a redesign of the panel for their two DC-3's.

Collins System ▶ These and similar efforts, however, are only designed to give the pilot a simpler and more logical rearrangement of the present standard instruments. In the Collins Integrated Flight System something new has been added, but the company claims that eventually some of the old stuff can be taken out. Sam Saint, chief of ATA's ANTC division, is boosting the system as a step in the right direction and believes these claims by Collins engineers are justified. Many airline pilots who have flown the system are inclined to go along with this.

The two new instruments are an Approach Horizon indicator and a Course Indicator. The combination gives the pilot the aircraft's position pictorially with respect to a pre-selected course. Altitude is displayed on the Approach Horizon, along with precise steering information for final approach. Position and heading are shown on the Course Indicator.

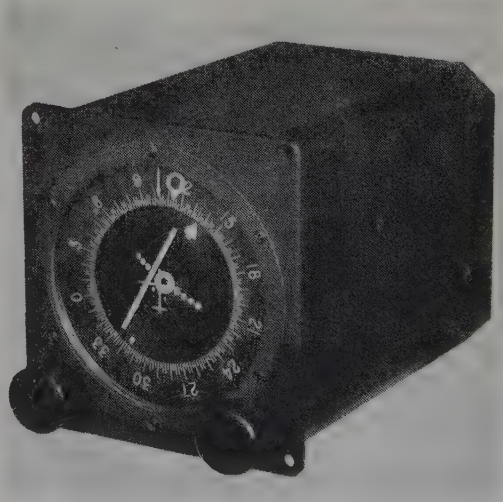
Pitch information is displayed by vertical movement of the outlined airplane in the center of the Approach Horizon; this moves up and down as the altitude of the aircraft is changed.

Displacement information with respect to the glideslope is superimposed on this same instrument. The small horizontal pointer (above G.S.) at the left of the Approach Horizon moves vertically, picturing the aircraft's position with respect to the glideslope (*photo below left indicates that the aircraft is below the proper position*).

The Course Indicator is a directional reference or compass card which has superimposed upon it a properly oriented pictorial presentation of the aircraft's heading and disp'acement in re-

(*Continued on page 56*)

COURSE INDICATOR *(right)* provides pictorial presentation of aircraft's heading and displacement with respect to both the ILS and the VOR course



APPROACH HORIZON *(left)* indicator provides roll and pitch reference with steering information and glide slope indication for simplified ILS approaches

Pilot's Job Simplified by Integrated Flight System

(*Continued from page 55*)

spect to the ILS or VOR course. The outer portion of the Indicator, driven by the aircraft's directional gyro, displays continuously the aircraft heading as read against the lubber line of the instrument. For ease in flying selected headings the card is provided with a marker which is set by turning the heading selector knob (left). A heading of 114° has been selected in the illustration (*see photo, right page 55*).

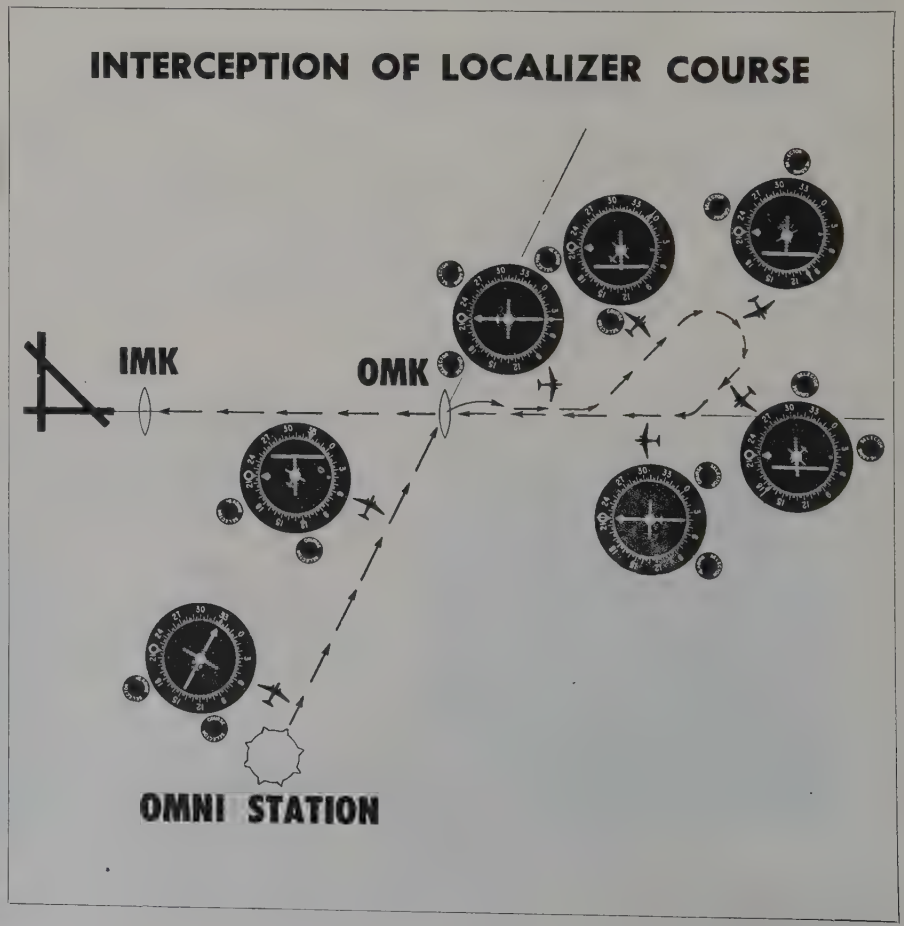
The inner portion of the Course Indicator provides a graphic picture of the aircraft's heading and displacement to selected ILS localizer or VOR course. To select a localizer or VOR course the position indicator is rotated by the course selector knob (right) to the desired course as indicated by the arrow pointer read against the compass card. The position indicator then rotates with the card as the aircraft heading is changed. Left-right deflection voltages from the aircraft's localizer or VOR receiver cause the course line bar to move across the face of the instrument, thus showing the aircraft's displacement from the selected course.

Since the bar also rotates as the aircraft's heading is changed, this bi-directional motion causes it to simulate exactly the selected course with respect to the aircraft. It shows both displacement of the plane from the selected course and direction of the course with respect to the aircraft heading. In the photo the pilot holding a heading of 102° (small arrow on outer portion of Course Indicator) sees that he is taking a cut of 34° toward his selected omnirange course of 136° (arrowhead on inner portion). If he continues on this heading, the course line bar will move downward from the left, picturing graphically his approach to the course. When he is on course, the bar will appear as an arrow passing through the center circle, as shown on the first and last positions on the VOR approach illustration.

VOR Flying ▶ TO and FROM indication for flying VOR courses is provided by an indicator which appears on the appropriate side of the instrument's center. If the course chosen is TO an omnirange station, the indicator will appear on the arrowhead side of the center (this is not shown in photo). As the plane passes over the station it automatically switches to the tail of the arrow.

The presentation of the course line deviation information pictorially elimi-

COURSE INDICATOR element of Collins Integrated Flight System is used for interception of localizer course. Course line and miniature plane in center give pilot indication of position



nates the sensing and ambiguity problems associated with the usual type of crosspointer indicator. When the miniature airplane is pointed toward the course-line bar, the aircraft is approaching the selected course. This is also true in ILS localizer service, regardless of whether flight is inbound or outbound on either the front or back course of the localizer.

The illustration on page 56 shows the use of the Collins flight system for interception of a localizer in a VOR approach instead of the old L/MF range approach (*see December 1951 SKYWAYS, Navicom section*).

The pilot is flying outbound from a VOR station on a track which intersects the outer marker (OMK). As he approaches this he sets in on the Course Indicator the localizer course and runway bearing (position two), makes a turn to the right and flies outbound along the localizer course, makes a procedure turn and begins his inbound flight toward the outer marker.

The information presented by the Course Indicator at successive stages in this flight are shown in the illustration. Note that the course-line bar simulates the localizer course exactly with respect to the aircraft heading. This and the varying aspects of the miniature airplane give the pilot at all times a graphic indication of his position with respect to the localizer course.

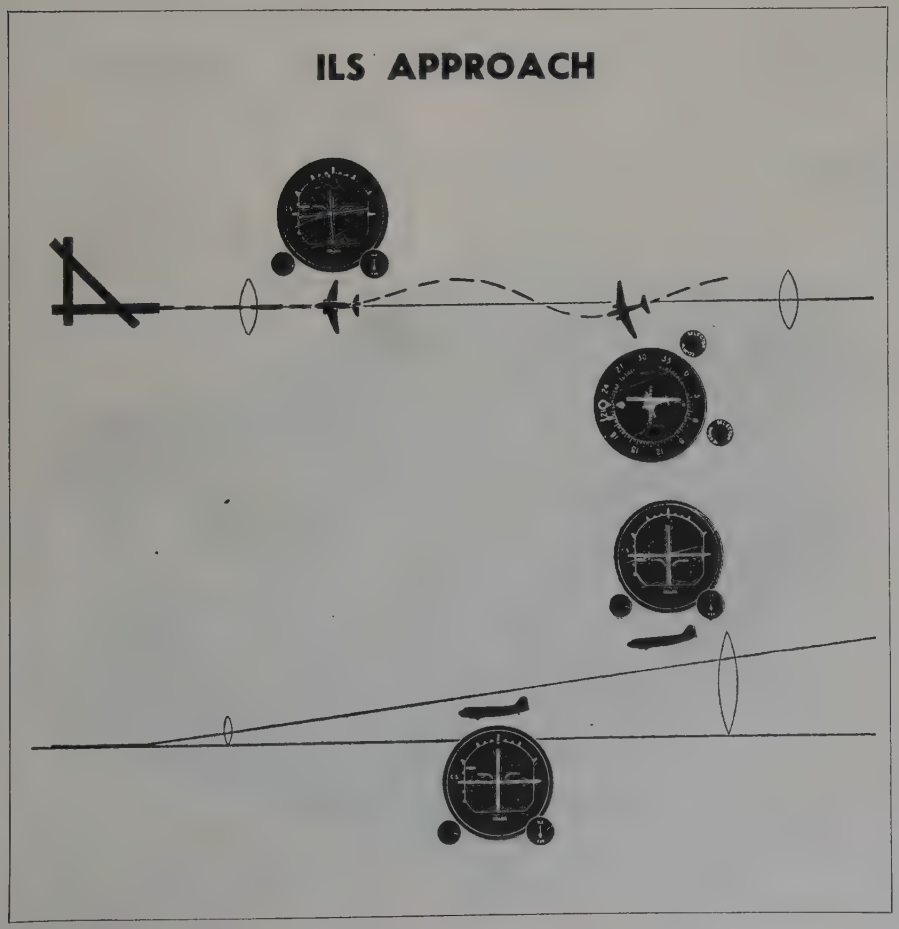
ILS Approach ▶ The final stages of an ILS approach are shown in the illustration below. In current systems using only displacement information from localizer and glideslope receivers, it is necessary for the pilot to execute a series of bracketing maneuvers to make good his approach. The frequency of bracketing increases as the runway is approached and if not corrected in time will call for excessively violent maneuvers after break-out to get on the runway. This difficulty is overcome by adding steering information to the flight system.

The vertical steering pointer on the Approach Horizon (*see photo page 55*) is used only between the outer marker and the runway. It displays precise steering information via the steering computer, from the aircraft's localizer receiver, compass and vertical gyro. Flight data from these three sources is fed into the steering computer which computes the steering information instant by instant. To make good the localizer course it is only necessary to maneuver the aircraft so as to keep the pointer centered.

Descent on the glideslope is accomplished by matching the pitch indicator to the glideslope pointer on the Ap-

(*Continued on page 58*)

APPROACH HORIZON indicator is used for final stages of ILS approach. Upper portion shows aircraft brought into line with runway at middle marker; lower portion shows descent on glide slope



Pilot's Job Simplified by Integrated Flight System

(Continued from page 57)

proach Horizon. In the illustration the aircraft is shown first above the glideslope (horizon bar and pitch indicator *above* the pointer at left) and then below the glideslope (position reversed on indicator).

The steering computer (vertical needle) on the Approach Horizon can also be used in flying compass headings on X-country flights. Switch the knob (lower right) to HDG (heading) and keep the pointer centered to maintain the heading selected by the Course Indicator.

The Approach Horizon indicator also provides a flag warning if the ILS and VOR receivers are not functioning properly. Proper operation is indicated when the flags are not in view.

Try-Out ▶ Most of this was outlined to us in a few moments by Captain Robertson, aided by several charts. After watching him pick up a course and shoot a simulated ILS approach at Washington National, CADA Board Chairman Cole Morrow tried it. Despite the fact that the general arrangement of the instrument panel of the Collins Twin-Beech was quite different from those in the J. I. Case Company's D-18-S and AT-11. Cole had no difficulty whatever, and turned in quite a smooth performance. He remarked that both the Collins system and the Sperry *Zero Reader* represent important advances toward the simplification of instrument flying and that either one provides a valuable safety factor in such flight.

Bendix Making Deliveries of the TA-18, Airline-Type 25-Watt VHF Transmitter

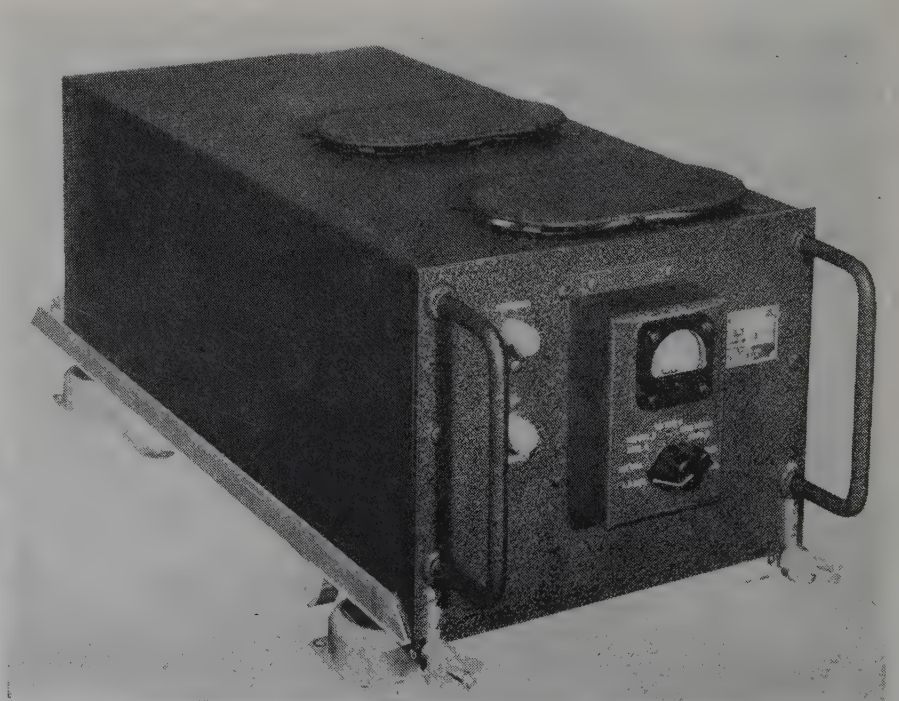
Bendix Radio Division, Baltimore, is now making deliveries of the TA-18 airline-type 25-watt VHF transmitter. Installations already have been made in Chicago & Southern *Constellations,* and TWA 4-0-4's, and American Airlines has been reported interested in the unit for part of the Flagship fleet. Several operators of corporate aircraft have placed orders in the light of the expected requirement for a considerably greater number of VHF transmitter frequencies within the next few months (*see article on this, page 30*).

The TA-18 has CAA Type Certificate 1R3-9. Two stable, crystal oscillators determine the output frequency. One oscillator, associated with a bank of 18 crystals, determines the whole megacycle frequency (such as 118 mc), while the second crystal oscillator, associated with a bank of 10 crystals, determines the tenth megacycle frequency (e.g., 118.3). Frequency range: 118.0-135.9 mc; 180 channels, 0.1 mc separation. Weight, 43 pounds, less shockmount.

VHF Monitor Receiver

A new VHF receiver, resembling a conventional home radio, has been placed on the market by Radio Apparatus Corp., 310 Fountain Sq. Bldg., Indianapolis, Indiana. This receiver can be used to monitor aircraft frequencies in the 108-132 mc band. The new receiver has been designated Model AR1.

BENDIX TA-18 is now available for corporate-aircraft installation. The set has a frequency range of from 118.0 mc to 135.9 mc; 180 channels, with 0.1 mc separation



SKYWAYS INDEX-1951

A ready reference indexed by aviation subject matter

Floating Air Bases . . .

(Continued from page 45)

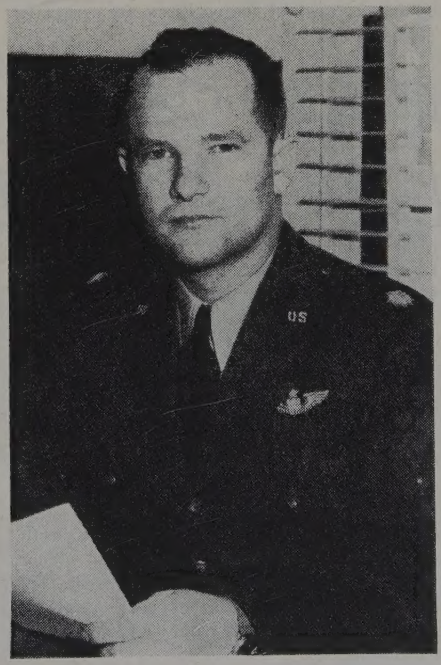
out what happened to the lost T-1.

In July, 1950, up near the Pole on a clear day, a patrol discovered a roughly rectangular slab of ice appromixately 20 by 20 miles in dimension. It was bigger than T-1. It was dubbed T-2. In a brilliant piece of photographic detective work that took her from nine o'clock one night until nine the next morning, Lynn Fletcher matched up the ridges in pictures of T-2 with those of the U. S.-Canadian discovery of 1947. The two ice masses were the same.

Later in the month, far to the north of Siberia, T-3—a kidney-shaped island, nine miles by four and one half—showed up on a radar screen and was photographed and tracked. The search for more new ice islands was continued through the summers of 1950 and 1951, but only one more was found—a tiny circlet a mile and a half in diameter, locked in the pack ice of Prince Otto Gustave Sound.

It wasn't until last August that T-1 was finally rediscovered, after an absence of two years, nestled up against the shore of Ellesmere Island. If all of the ice islands come from the mother glacier on Ellesmere, which seems the only place possible, then the youngest is several centuries old, the oldest perhaps thousands of years old.

Since they were first sighted, the islands have not diminished in size. Although they melt a little in summer, they make up the deficit by adding ice on the bottom in winter. If they continue drifting in the Beaufort Eddy, they should last for centuries. But if they should escape from the arctic into the warm waters of the Atlantic through the passage between Greenland and Spitsbergen, they would melt and die. T-1 has already avoided that fate, having started back westward with the Beaufort Eddy. T-2 is now at the fateful corner, making up its mind. T-3 is still many, many years away from having to make a choice.



SKIPPER of the 58th Reconnaissance Squadron is Lt. Col. Joseph O. Fletcher, USAF

The potential scientific value of these floating islands is immense. The Artic Ocean, scientifically speaking, is still largely a blank space on the map; here, now, are stable platforms from which measurements of weather, currents, magnetic fields of force, gravitational forces, the topography of the ocean floor, can be made. The first ice-island scientific base will probably be established within the next year.

No one in authority in Alaska likes to talk about the military value of the islands. Two facts stand out, however. First, airfields to accommodate our largest bombers could be built on them without difficulty. Second, the islands are several hundred miles closer to Russia than our nearest available land bases. These ice cakes, if proved impervious to bombing or torpedoing because of their thickness, could be used as staging or refueling bases for B-36's, as emergency landing fields for crippled bombers, or as homing stations or bases for accompanying fighter planes. "If it comes to war, you can bet your last dollar that every one of these ice islands will house some sort of Air Force base," a general very high up in the Alaskan command told me recently.

Meanwhile, to whom do the islands belong? They have drifted from United States to Canadian to Danish to Russian waters, and back again. T-2 last February rested smack atop the North Pole which, scientists insist, cannot actually belong to anyone since it is an imaginary point in space. International law has nothing to say about the citizenship of unattached cakes of ice. It will be interesting to watch future attitudes.

Dilbert

(*Continued from page 29*)

switch *instead* of his tank selector valve. When he woke up it was too late—he was in the hospital.

Educate your reflexes!

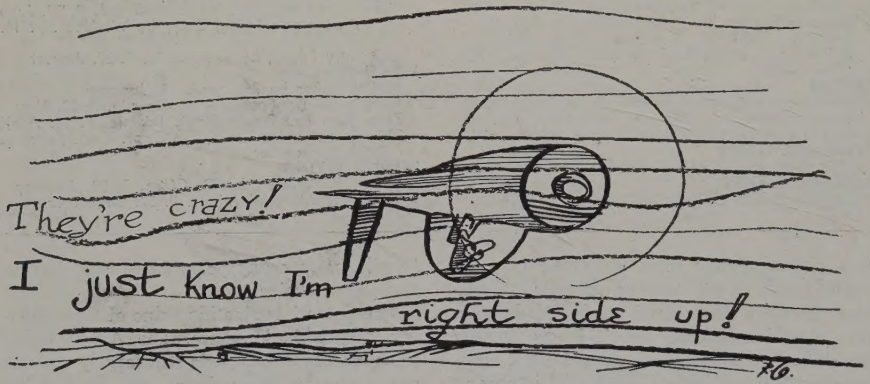
Don't Trust Yourself—It takes willpower to fly by instruments. The reason is that your senses mislead you as to the attitude of your airplane. You must deliberately ignore them when flying in the soup, and rely entirely on your instrument panel.

It's the fluid in your inner ear which causes most of the trouble. Knowing this, and knowing what the sensory illusions are, may help you ignore them.

1. During a steep turn, centrifugal force may produce a sensation of climbing.

2. Returning to level flight from a steep turn, the removal of centrifugal force from the body leads to a feeling of less than normal weight and a sensation that the airplane is falling.

3. When a plane skids in a turn, the sensation is that of a tilt opposite to the direction of the true turn.



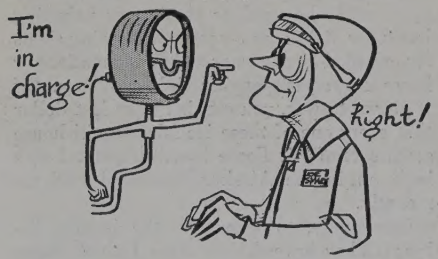
4. While on instruments, a false sensation of turning often occurs in a straight-and-level flight. This may be due to:

a. The eyes working in conjunction with the ears and receiving false sensations from the latter.

b. False sensations of rotation produced in the inner ear when in turbulent air.

c. Correction of the course for propeller torque with the rudder often gives a sensation of turning.

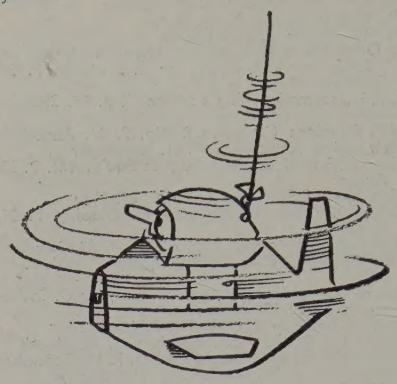
d. During a sharp turn, movement of the head often leads to the feeling that the aircraft is diving or tipping; and during a spin, the sensation of going beyond the vertical.



It is easy to see how correcting for these false sensations would lead to serious trouble. When on instruments, remember that *your senses will deceive you, but the instruments tell the truth!*

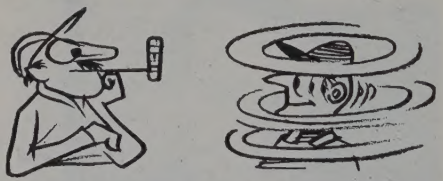
That Stall-Spin Bogy—Spins following inadvertent stalls cause a large percentage of serious accidents. Of course, most of them are due to "Pilot Error".

On the theory that most of these stall-spins occur because of ignorance rather than heedlessness, one flight school has initiated an elaborate spin-recovery program in their syllabus.



The course includes training in 20 different kinds of stalls. They are: normal cruising, climbing, climbing turns, normal turns, and steep turns; each under four conditions: 1. Flaps up, sufficient power; 2. Flaps up, insufficient power; 3. Flaps down, sufficient power; and 4. Flaps down, insufficient power.

Practically all attitudes and position of a stalled airplane are shown. The stalling speeds for each of the positions are especially stressed.



The roll-out method of recovery from inverted spins is taught, rather than the old split-S type. This method results in less loss of altitude and lower airspeed upon recovery.

I'd say that pretty well eliminates the "ignorance" angle of stall-spins for these students.

Aeronautical Barbecue—This concoction, also known as "Dilbert Stew" in some sections, is easily prepared and quite popular during the winter months. As every one knows, too many cooks spoil the broth, so don't let the aerologist, the flight officer, or the tower personnel help mix this up. The recipe varies with different cooks, but the following formula is one of the most successful.

Ingredients:

1 airplane
1 pilot (pick a fresh, hot one)
3 hours fuel
1 point of departure
1 compass heading (approximate only)
1 old chart
2 or 3 pinches of panic
1 parachute
Fog, rain, snow, darkness; to taste
4 or 5 well-worn alibis

Directions:

For best results do not start mixing until about two hours before sunset. Place fuel and chart in the airplane. Caution: be sure chart is well aged; sift out all up-to-date charts. Quickly blend in pilot and parachute, being careful to avoid any briefing. Place this mixture on approximate heading for destination and allow to simmer gently for two hours. Season with sprigs of rain, snow, or fog, to taste, and stir in generous portions of turbulence.

When pilot is thoroughly done, indicated by his rosy color, moist brow and rapid breathing, prick gently with a fork and sprinkle in a pinch or two of panic. Then use ladle to skim off any remaining fuel, and place parachute rip cord in the pilot's hand.

The Barbecue is now ready to serve. Rotate plane briskly one or two turns and remove pilot and parachute from the mixture. If parachute blossoms, serve pilot on a hot platter, using his well-worn alibis as a garnish.

If parachute does not function, start all over again with fresh ingredients.

SETH'S SAFETY QUIZ

1. How can you detect carburetor icing by reference to your instrument panel?

2. Why is it dangerous to have an excessively rich idle mixture?

3. After leaving the cockpit in an emergency parachute jump, what should be your first consideration?

ANSWERS

1. There will be a loss of manifold pressure when flying at a constant altitude and constant power setting.

2. Danger from loss of power during take-off, due to spark plugs fouling and shorting out.

3. Be sure you are clear of the plane before pulling the rip cord, to prevent canopy or shroud lines from getting caught on tail surfaces.

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